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THIRD QUARTER MONITORING REPORT

JULY TO SEPTEMBER 1998

KIN-BUC LANDFILL OPERABLE UNITS 1 AND 2

Prepared for

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SUMMARY

The Kin-Buc Landfill Site is a closed 200-acre industrial/commercial landfill located in Edison, New \ Jersey, which operated under a New Jersey Department of Environmental Protection (NJDEP) permit until 1976. The USEPA placed the Kin-Buc Landfill on the National Priorities List (NPL) in 1981. Between 1983 and 1988, the Respondents conducted a Remedial Investigation/Feasibility Study (RI/FS) which resulted in a Record of Decision (ROD) by USEPA in 1990. The ROD called for source control of Operable Unit 1 (OU1), and a second RI/FS to determine the nature and extent of contamination outside the source area, thus defining Operable Unit 2 (OU2). Following the completion of this RI/FS, a second ROD was issued for OU2 in 1992.

OU1 includes both Kin-Buc I and II Mounds, the former Pool C Area, and a portion of the Low-Lying Area between Kin-Buc I and the Edison Landfill. The remedial action specified in the ROD for OU1 included the construction of a slurry wall around OU1, the collection and treatment of leachate and groundwater from within the containment area, and the capping of the area within the slurry wall. OU2 includes Mound B, Edmonds Creek and adjacent wetlands, the remaining Low-Lying Area between OU1 and the Edison Landfill, Martins Creek, and the Raritan River. The OU2 ROD called for the excavation and disposal of PCB-contaminated sediments from within the Edmonds Creek Marsh Area, the restoration of disturbed wetland areas, and groundwater/surface water monitoring. Remedial construction activities for both OU1 and OU2 were completed by the end of August 1995. In accordance with the RODs, water quality, hydraulic and landfill gas monitoring is required to evaluate the effectiveness of the remedial actions. This report documents the results of the Third Quarter 1998 monitoring activities.

In accordance with a modified annual monitoring program which was initiated during the Fourth Quarter of 1997, only hydraulic control and landfill gas migration monitoring was performed for the Third Quarter of 1998. The annual water quality monitoring event will take place again in the Fourth Quarter of 1998. Hydraulic control and landfill gas migration monitoring will be performed for all quarters during 1998, and wetlands restoration monitoring will take place in the Second and Fourth Quarters of 1998. The modified annual monitoring program is detailed in the November 1997 Final Field Sampling Plan (FSP) for the Kin-Buc Landfill Superfund Site.

The key findings made during the Third Quarter of 1998 are summarized as follows:

- Three months of continuous water level monitoring data indicates that intragradient conditions were maintained at TL Nos. 2, 4 and 5 within the refuse unit of OU1 and the Oil Seeps Area during the Third Quarter of 1998. Intragradient conditions were not maintained at TL No. 1 during the quarter. No continuous water elevation data is available for W-5G to confirm the gradient conditions at TL No. 3; however, manual measurements at TL No. 3 indicated inward gradients.

- Based on the three synoptic rounds of manual water level measurements, an upward vertical gradient between the bedrock and the overlying sand and gravel is not being uniformly maintained.

- According to treatment plant operation records, groundwater withdrawal was greater than 15,000 gpd in July and September, and greater than 30,000 gpd in August.

- Monitoring well W-3G contained Light Non Aqueous Phase Liquid or LNAPL (oil product) during each head level monitoring event during the quarter. The product head level was used as the test reference level elevation, but the product may be affecting the Troll operation and continuous hydraulic level monitoring results. However, the manually-collected level monitoring data still indicates that intragradient conditions are maintained in the refuse at TL No. 2 (W-3G/W-4G).

- Combustible gas was not detected in any of the six gas monitoring wells located on the north side of OU1. Monitoring conducted on August 24, 1998, at the operational flare port inlet revealed that the landfilll gas collection system was delivering 60 percent combustible gas (methane) to promote proper combustion at the flare.

1 INTRODUCTION

1.1 Purpose Of Monitoring

A modified monitoring program has been initiated at the Kin-Buc Landfill. The modified monitoring program resulted from an evaluation of the existing monitoring program and a determination that the existing program did not adequately monitor changes in water quality attributable to the remedy (source control in OU1 and natural attenuation in OU2). Subsequently, a Field Sampling Plan (FSP) was developed by EMCON/OWT on behalf of the Respondents, with input from USEPA. Annual collection of groundwater samples via low-flow techniques was adopted to replace the conventional purge and sample techniques used previously.

The purpose of the modified annual monitoring is to examine the effectiveness of the OU1/OU2 and Oil Seeps Area Remedial Design/Remedial Action (RD/RA) by evaluating changes in water quality attributable to the remedy of source control in OU1 and natural attenuation in OU2. The modified monitoring program has been in effect at the Kin-Buc Landfill since the Fourth Quarter of 1997 and so far includes the collection, analysis, and report on the 1998 annual monitoring event. The second semi-annual monitoring event is scheduled for the Fourth Quarter of 1998.

Quarterly hydraulic and landfill gas migration monitoring pursuant to the existing program, continues under the modified monitoring program. The Third Quarter of 1998 monitoring provides hydraulic and landfill gas migration monitoring data following the implementation of the OU1 and OU2 remedies.

1.2 Purpose of Report

The purpose of this report is to present the hydraulic and landfill gas migration monitoring results for the modified OU1 and OU2 monitoring program for the Third Quarter of 1998. The data obtained during this monitoring period will be used to supplement a database that documents the modified monitoring program findings. The report comments on hydraulic control for OU1 inside and outside of the circumferential soil-bentonite slurry wall. Data generated will be used to evaluate the performance of the

slurry wall as a hydraulic barrier. Landfill gas migration monitoring results are examined relative to operational flare performance and soil gas evidence outside the slurry wall.

1.3 Site Background

The Kin-Buc Landfill Site is a 200-acre closed industrial/commercial landfill located at the end of Meadow Road in Edison, New Jersey. The site is bordered by the Edmonds Creek Marsh Area (ECMA) to the east, the Edison Landfill to the south, the Raritan River to the west, and industrial use to the north. The Kin-Buc Landfill was used for the disposal of municipal, industrial, and hazardous waste as early as 1947. The largest volumes of waste apparently consisted of industrial waste material, wastewater/liquid and sludge. It was a New Jersey State-approved (NJDEP) landfill between 1971 and 1976. In 1976, the NJDEP revoked Kin-Buc's operating permit upon United States Environmental Protection Agency (USEPA) investigation. In 1981, Kin-Buc was placed on the CERCLA Superfund National Priorities List (NPL).

A Record of Decision (ROD) issued in September 1990 by the USEPA to the Respondents, mandated a Remedial Design/Remedial Action (RD/RA) for OU1. The Remedial Action construction was implemented between March 1994 and August 1995, and included the construction of a circumferential slurry wall, collection and treatment of leachate and groundwater from within the slurry wall containment area, and construction of a low permeability final cover system (Blasland, Bouck & Lee, September 1995, Revised February 1996).

A separate ROD was issued by the USEPA to the Respondents in November 1992 for OU2. The Remedial Action for OU2 included the excavation of PCB-contaminated sediment from within the ECMA, disposal of the excavated material within the OU1 slurry wall, and restoration of excavated wetlands. Operable Unit 2 Remedial Action was substantially completed in July 1995 (Blasland, Bouck & Lee, September 1995, Revised February 1996).

1.4 Third Quarter Monitoring Activities

Monitoring and sampling for the Third Quarter of 1998 (July to September) took place according to the procedures and methods outlined in the Draft Operations and Maintenance (O&M) Manual for the Kin-Buc Landfill, prepared on behalf of the Respondents by Wheelabrator EOS in September 1995 as modified by letter to EPA dated February 28, 1996. The modified hydraulic monitoring program will be approved by the USEPA upon final approval of the Draft O&M Manual. Continuous water level monitoring for the Third Quarter of 1998 was recorded during July, August, and September. Eighteen In-Situ "Trolls" in the OU1 refuse and sand/gravel wells have

generated 3 months of water level data that are evaluated in Sections 3 and 5 of this report.

Three manual water level monitoring events were performed for the Third Quarter of 1998 on July 31, August 24, and September 24 in all the OU1 and OU2 monitoring wells. The continuous hydraulic monitoring test period extends from June 30, 1998 to September 24, 1998. Landfill gas migration monitoring was performed on August 24, 1998 at the operational flare port inlet and the 6 gas migration monitoring wells located along the northern edge of the landfill boundary.

2 DESCRIPTION OF MONITORING PROGRAM

2.1 Operable Unit 1 Hydraulic Control

The hydraulic monitoring system for Operable Unit 1 is located along the circumferential slurry wall in the component areas consisting of:

- Kin-Buc I Mound
- Kin-Buc II Mound
- Pool C Area
- Low-Lying Area contained by circumferential slurry wall
- Oil Seeps Area

The hydraulic monitoring well network (Table 2-1) consists of 10 wells screened in the refuse/fill, and 8 wells screened in the sand and gravel. The OU1 hydraulic well network is designed to monitor groundwater elevations inside and outside of the circumferential slurry wall to evaluate the performance of the slurry wall as a hydraulic barrier. The hydraulic monitoring wells are located along 5 transects, which are installed in pairs to monitor the same hydrogeologic units across the slurry wall, so that elevations on either side of the wall can be evaluated. The well pairs are indicated in Table 2-1.

At 3 transect locations (TLs), the hydraulic monitoring wells are installed as pairs that monitor the refuse and sand/gravel units. These locations are:

- Transect Location No. 2: W-3G/W-4G, W-3S/W-4S
- Transect Location No. 3: W-5G/W-6G, W-5S/W-6S
- Transect Location No. 4: W-15G/W-13G, W-15S/W-13S, W-7S/W-8S

Two TLs have hydraulic monitoring wells installed as pairs in the refuse unit only due to the absence of sand and gravel deposits in those areas of the site. These locations are:

- Transect Location No. 1: W-1G/W-2G
- Transect Location No. 5: W-9G/W-10G

A discussion of groundwater elevation observations for OU1 follows in Section 3.1. Operable Unit 1 hydraulic monitoring results are summarized in Sections 5.1 through 5.3.

2.2 Operable Unit 2

The hydraulic monitoring system for OU2 consists of the wells indicated in Table 2-2. The wells are monitored concurrent with the OU1 manual water elevation measurements. The OU2 hydraulic monitoring well network monitors elevations in the Low-Lying Area and Mound B following containment of OU1. A discussion of groundwater elevation observations follows in Section 3.2, and are summarized in Section 5.4.

2.3 Landfill Gas Migration

The landfill gas migration monitoring system consists of 6 wells screened in the overburden outside the circumferential slurry wall along the northern edge of the landfill border. The operational flare port inlet is located along the blower run just prior to the destruction flare and provides total methane concentration of the gas stream reaching the flare unit.

3 HYDRAULIC MONITORING

The hydraulic monitoring program for OU1 has been designed to assess the hydraulic performance of the circumferential slurry wall. Specifically, the maintenance of lower hydraulic heads inside relative to outside of the slurry wall will represent intragradient flow conditions. This condition would minimize the potential for contaminant migration beyond the limits of the wall. Also, the monitoring program will assess the ability of the groundwater pumping inside the wall to achieve and maintain an upward gradient between the bedrock and the overlying sand and gravel deposits. The attainment and maintenance of upward vertical gradients will minimize the potential for vertical migration of contamination into the bedrock groundwater regime.

3.1 Operable Unit 1

Hydraulic monitoring has been conducted at the site pursuant to the Hydraulic Performance Monitoring Plan, as revised in February 1996. Components of the hydraulic monitoring program consist of continuous and manual water level measurements in the refuse and sand/gravel wells, and manual measurements in the bedrock wells immediately inside and outside of the circumferential slurry wall. Continuous water level measurements were obtained at 1-hour intervals using an In-Situ "Troll" Model SP4000 data logger and transducer. Manual measurements were obtained with an electronic water level indicator. The 5 TLs are shown on Drawing 1.

Hydraulic monitoring took place from June 30, 1998 to September 24, 1998 in 18 OU1 and Oil Seeps Area refuse and sand/gravel wells for this Third Quarter of 1998. Three months of continuous water level data have been obtained for analysis. Manual measurements were obtained during July 31, August 24, and September 24, 1998. The manual water level monitoring results are provided in Table 3-1.

The continuous water level monitoring information and Troll operation were checked by comparing the Troll continuously recorded water elevation results with the three manual water level elevation event results. Any Troll operational difficulties or apparent data set discrepancies are discussed in Section 5.2 of this report.

3.2 Operable Unit 2

Manual measurements were also obtained from the OU2 wells sampled annually as part of the modified groundwater quality monitoring program, which includes the Low-Lying Area and Mound B. Manual measurements were obtained July 31, August 24, and September 24, 1998 concurrent with the hydraulic monitoring in OU1. The manual water level monitoring results are provided in Table 3-1.

3.3 Leachate Withdrawal/Groundwater Pumping

The performance of the site hydraulic controls is largely dependent upon groundwater pumping and leachate withdrawal rates. Current aqueous collection system leachate (LCH) and groundwater (GW) withdrawal rates differ somewhat from the rates used for design of 3:1, groundwater to leachate (30,000 gpd GW: 10,000 gpd LCH). The variation in collection rates is due to changing site and operational conditions.

In order to understand any correlation between withdrawal rates and hydraulic control, treatment plant operation records for the monitoring period were reviewed. The operation records contain estimated daily averages for leachate and groundwater withdrawal as provided by the treatment plant operator.

According to the information provided, groundwater withdrawal efficiency was greater than 15,000 gpd and was greatest in August. Groundwater withdrawal for the quarter is reportedly greater than previous quarters. Leachate withdrawal for the quarter varied, and total withdrawal for the quarter is down compared to previous quarters. The estimated monthly daily average flows were:

- July - 19,707 gpd GW: 467 gpd LCH
- August - 30,661 gpd GW: 4,719 gpd LCH
- September - 16,330 gpd GW: 570 gpd LCH

Withdrawal totals are estimated and actual withdrawal volumes may differ. The withdrawal rates are examined relative to the hydrographs supplied in Appendices A and B, as well as vertical gradients provided in Table 5-1. Section 5 of this report presents the observations based on this information.

4 LANDFILL GAS MIGRATION MONITORING

All areas of OU1 exterior to the slurry wall contain waste materials except along the northern edge of the landfill boundary. Gas monitoring in the areas containing waste materials will likely reveal combustible gas. Since no on-site OU1 buildings are present, except the leachate treatment facility which has its own engineered gas monitoring and control system, gas migration monitoring in the waste areas is not required by the O&M manual.

The purpose of the gas migration monitoring program is to monitor for off-site gas migration in those areas where gas migration or accumulation could lead to explosive conditions. Six gas migration monitoring wells are located outside of the circumferential slurry wall along the northern edge of the landfill boundary. The well locations are depicted on Drawing 1 and are spaced in 200-foot increments. Gas is not expected to be detected for the following reasons: the slurry wall will act as an effective barrier, the presence of an active gas extraction system and a high water table that will inhibit gas migration.

4.1 Gas Monitoring Well Results

Measurements of percent combustible gas (% GAS) and percent lower explosive limit (% LEL) were performed in the six gas migration monitoring wells indicated in Table 4-1 on August 24, 1998. The wells were monitored according to Attachment 1, Section 3.0 Routine Operations and Maintenance, of the Kin-Buc Landfill Draft O&M Manual (Wheelabrator, 1995). A LandTec GEM 500 was used to measure the concentration of combustible gas at each well by attaching the meter's sample tubing to the well head petcock and drawing the sample through the meter. No detectable levels of percent combustible gas or percent lower explosive limit were detected in the 6 gas migration monitoring wells (Table 4-1).

4.2 Operational Flare Monitoring Results

The percent combustible gas by volume (% GAS) at the landfill's operational flare was recorded on August 24, 1998. Monitoring with the GEM 500 with a carbon filter attached revealed combustible gas at the flare port inlet at 60 percent.

5 HYDRAULIC MONITORING RESULTS SUMMARY

The hydraulic monitoring program calls for the preparation of tables and hydrographs summarizing groundwater flow conditions at the site. Previously presented in Section 3, Table 3-1 summarizes the manual water level measurements obtained from the OU1 and OU2 monitoring wells. Table 5-1 provides a summary of the vertical gradients (upward or downward) at the different well cluster locations during the Third Quarter of 1998. Appendix A provides hydrographs of continuous water level measurements of the refuse wells inside and outside the slurry wall. Each hydrograph consists of an interior and exterior refuse well at each individual transect location for visual assessment of intragradient conditions. The hydrograph for the outside paired well is bolded for illustration. Appendix B contains the individual hydrographs for each well where continuous monitoring was conducted, including the sand and gravel wells. The following Sections 5.1-5.3 include a discussion of the results of the hydraulic monitoring program. Section 5.4 provides the conclusions for the hydraulic monitoring activities, and recommendations for facility performance.

5.1 Assessment of Intragradient Conditions Within the Refuse - OU1

A review of Appendix A, which represents hydrographs of refuse wells inside and outside the circumferential slurry wall at TL Nos. 1 through 5 indicates that intragradient conditions were maintained at TL Nos. 2, 4 and 5. According to the hydrographs of the paired wells at TL Nos. 2, 4, and 5, the hydrographic head levels in the refuse were lower inside the wall relative to outside the wall at those locations. At TL No. 1, intragradient conditions were not maintained for the quarter. At TL No. 3, the hydraulic gradient could not be confirmed via Troll recorded measurements since no data was recorded for W-5G.

At TL No. 1 (W-1G/W-2G), extragradient conditions were evident during the quarter. the maximum head level difference between the two wells was approximately 5 feet.

At TL No. 2 (W-3G/W-4G), intragradient conditions were consistently maintained through the quarter. The difference in head elevations between the two wells was greatest at approximately 3 feet.

At TL No. 3 (W-5G/W-6G), the horizontal hydraulic gradient could not be confirmed via the Troll recorded measurements since no data was recorded for W-5G. However, the three manually recorded water level elevations on July 31, August 24, and September 24 in W-5G indicate that intragradient conditions prevailed during the quarter.

At TL No. 4 (W-15G/W-13G), across the Oil Seeps Area extended slurry wall, intragradient conditions were evident throughout the quarter. The average head elevation difference between the two wells was generally 4 feet.

At TL No. 5 (W-9G/W-10G), intragradient conditions were maintained throughout the quarter. The average head elevation difference between the two wells was approximately 0.5 feet.

5.2 Continuous Hydraulic Monitoring Results vs. Manual Elevation Measurements

Troll transducer and data logger operation in the Third Quarter of 1998 was generally found to be satisfactory. At TL No. 3, no data was recorded for the quarter in W-5G. According to test startup procedures, the Troll indicated proper functioning, but no data was able to be retrieved on test download. At the outside paired well, W-6G, at TL No. 3, no data was recorded for the last two weeks of the quarter. For all three water level monitoring events, the manual water level elevation measurements and Troll recordings for the same day and hour were found to be in general agreement with the following exceptions noted.

- July 31, 1998 — At W-9G, a 0.21-foot difference between the Troll and manual recording was evidenced.
- August 24, 1998 — At W-4S, a 0.24-foot difference between the Troll and manual recording was evidenced.
- September 24, 1998 — At W-6G and W-15G, a 1.33 foot and 0.42 foot difference, respectively, between the Troll and manual recordings was evidenced.

  The above-noted exceptions to Troll versus manual water level elevation measurements likely indicate minor fouling of the Troll pressure access ports or reader variability during field efforts.

- September 24, 1998 — At W-3G, a 0.47 foot difference between the Troll and manual recording was evidenced. During the July and August level monitoring events, only approximate head levels could be obtained. Approximately 1 to

2 feet of LNAPL is present in the well and may be affecting the Troll and continuous hydraulic level monitoring results. The manually collected level monitoring data still indicates intragradient conditions at TL No. 2 (W-3G/W-4G).

5.3 Assessment of Vertical Hydraulic Gradients - OU1

Table 5-1 summarizes the vertical gradients between the monitoring well clusters along the TLs based on synoptic measurements made on July 31, August 24, and September 24, 1998. For the original OU1 containment, vertical gradients are examined between the sand/gravel and bedrock wells to assess the effects of groundwater pumping on the hydraulic gradient between the bedrock and sand/gravel units. These synoptic measurements represent a snap shot picture of conditions at the site.

In assessing vertical gradients, head differences equal to or greater than 0.1 feet between the shallow and deep installations was considered significant. Where head differences were less than 0.1 feet, an "even" gradient was assumed. In other words, this was interpreted to mean that no upward or downward vertical gradients were evident. This was done in consideration of the potential margin of error inherent in manual water level measurements.

Generally, the pumping in the sand and gravel has not provided upward gradient conditions from the bedrock to the sand and gravel inside the slurry wall.

For the supplemental containment in the Oil Seeps Area, vertical gradients were examined between the sand/gravel and refuse wells to assess the effects of leachate removal on the hydraulic gradient between the monitored geologic units. An upward vertical gradient was evident from the sand/gravel and refuse at W-15G/W-15S on July 31, August 24, and September 24. A downward gradient was evidenced from the sand/gravel and refuse at W-13G/W-13S during each of the three manual monitoring measurement periods this quarter.

5.4 OU2 Hydraulic Monitoring

The groundwater elevations obtained during the Third Quarter of 1998 synoptic measurements indicate both upward and downward hydraulic gradients.

Downward hydraulic gradients prevail between the refuse and the underlying sand and gravel. Upward hydraulic gradients were noted between the bedrock and overlying sand and gravel at WE-3S/WE-3R on July 31 and September 24, and at WE-7S/WE-7R on July 31 and August 24. "Even" gradients were evidenced from the sand/gravel and refuse at WE-10S/WE-10R on July 31 and August 24 and September 24, and at WE-3S/WE-3R on August 24.

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Draft Operations and Maintenance Manual for the Kin-Buc Landfill, Wheelabrator EOS, Inc., Pittsburgh, PA, August 1995.

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Draft Remedial Investigation Report for Kin-Buc Landfill Operable Unit 2, Wehran Engineering Corporation, Middletown, New York, October 1990.

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Kin-Buc Landfill Leachate Treatment Plant Operation and Site Post-Closure Care, Monthly Reports, Wheelabrator EOS, April, May, June 1997.

TABLES

Table 2-1

Kin-Buc Landfill
Operable Unit 1
Modified Program
Hydraulic Monitoring Well Network/Transects

Transect Location No.	Screened Hydrogeologic Unit	Well Location Inside Slurry Wall	Well Location Outside Slurry Wall
1	Refuse/Fill	W-1G	W-2G
2	Refuse/Fill Sand and Gravel	W-3G W-3S	W-4G W-4S
3	Refuse/Fill Sand and Gravel	W-5G W-5S	W-6G W-6S
4	Refuse/Fill(1) Sand and Gravel(1) Sand and Gravel(2)	W-15G W-15S W-7S	W-13G W-13S W-8S
5	Refuse/Fill	W-9G	W-10G

Notes:
(1) Wells located across the Oil Seeps Area extended slurry wall.
(2) Wells located across the OU1 circumferential slurry wall

Table 2-2

Kin-Buc Landfill
Operable Unit 2
Modified Program
Hydraulic Monitoring Network

Well Location	Screened Hydrogeologic Unit
Low-Lying Area	
GEI-10G	Fill/Refuse
WE-10S	Sand & Gravel
WE-10R	Bedrock
GEI-3G	Fill/Refuse
WE-3S	Sand & Gravel
WE-3R	Bedrock
Mound B	
GEI-5G	Fill/Refuse
WE-5S	Sand a Gravel
WE-5R	Bedrock
GEI-6G	Fill/Refuse
GEI-6S	Sand & Gravel
WE-6R	Bedrock
GEI-7G	Fill/Refuse
WE-7S	Sand & Gravel
WE-7R	Bedrock
Upgradient	
WE-114DR	Bedrock

Table 3-1
KinBuc Landfill Operable Units 1 and 2
Modified Monitoring Program
Third Quarter 1998
Manually Recorded Water Level Elevations

Well ID	TOC Bottom	TOC Ref Elevation	July 31		August 24		September 24	
			TOC Static	Elevation	TOC Static	Elevation	TOC Static	Elevation
OU1								
W-1G	20.52	30.55	14.59	15.96	14.97	15.58	15.53	15.02
W-1R	35.34	30.57	19.18	11.39	18.77	11.80	19.69	10.88
W-2G	20.83	30.58	19.84	10.74	17.49	13.09	19.32	11.26
W-2R	35.33	30.62	22.26	8.36	21.93	8.69	22.61	8.01
W-3G(1)	19.07	20.83	11.70	9.13	12.30	8.53	13.90	6.93
W-3S	31.48	20.74	19.91	0.83	20.06	0.68	19.20	1.54
W-3R	53.84	20.54	19.80	0.74	20.14	0.40	19.51	1.03
W-4G	17.57	20.13	9.59	10.54	9.57	10.56	9.61	10.52
W-4S	31.58	19.68	18.63	1.05	18.83	0.85	18.42	1.26
W-4R	54.92	19.62	19.34	0.28	19.83	-0.21	19.50	0.12
W-5G	24.36	24.46	14.60	9.86	14.51	9.95	14.60	9.86
W-5S	30.33	24.43	23.66	0.77	23.59	0.84	22.38	2.05
W-5R	41.64	24.44	23.80	0.64	23.77	0.67	22.31	2.13
W-6G	23.99	24.23	11.82	12.41	9.98	14.25	11.14	13.09
W-6S	38.49	24.21	23.10	1.11	22.97	1.24	22.04	2.17
W-6R	50.43	24.27	23.11	1.16	22.97	1.30	22.02	2.25
W-7G	20.63	18.37	8.77	9.60	8.56	9.81	8.89	9.48
W-7S	29.34	11.71	10.16	1.55	10.06	1.65	9.47	2.24
W-7R	45.13	11.14	9.53	1.61	9.43	1.71	8.91	2.23
W-8S	28.86	10.92	8.77	2.15	8.92	2.00	8.42	2.50
W-8R	42.91	10.56	8.71	1.85	8.69	1.87	8.17	2.39
W-9G	21.93	27.04	19.84	7.20	19.64	7.40	19.91	7.13
W-9R	39.05	27.27	21.16	6.11	21.11	6.16	21.68	5.59
W-10G	22.56	27.06	19.16	7.90	19.25	7.81	19.26	7.80
W-10R	34.01	26.99	19.52	7.47	19.51	7.48	20.26	6.73
W-13G	10.30	10.55	4.18	6.37	3.81	6.74	3.88	6.67
W-13S	29.32	10.60	8.15	2.45	8.25	2.35	7.80	2.80
W-15G(2)	17.04	17.03	14.76	2.27	14.67	2.36	15.15	1.88
W-15S	33.36	16.91	14.35	2.56	14.24	2.67	13.79	3.12
OU2								
GEI-10G	13.91	13.65	1.80	11.85	0.53	13.12	1.22	12.43
WE-10S	29.57	14.99	13.87	1.12	13.66	1.33	13.23	1.76
WE-10R	41.74	13.96	12.82	1.14	12.61	1.35	12.23	1.73
GEI-3G	13.54	16.73	5.10	11.63	4.22	12.51	4.56	12.17
WE-3S	25.67	15.12	14.31	0.81	14.07	1.05	13.56	1.56
WE-3R	46.51	14.99	14.05	0.94	13.93	1.06	13.29	1.70
GEI-5G	14.60	16.08	9.18	6.90	9.17	6.91	9.22	6.86
WE-5S	25.84	15.04	13.88	1.16	13.70	1.34	13.24	1.80
WE-5R	49.64	15.31	14.35	0.96	14.20	1.11	13.52	1.79
GEI-6G	14.97	19.76	11.64	8.12	11.66	8.10	11.72	8.04
GEI-6S	43.67	20.99	19.45	1.54	20.08	0.91	18.44	2.55
WE-6R	47.12	19.62	18.26	1.36	18.86	0.76	17.34	2.28
GEI-7G	13.74	17.23	DRY	DRY	12.61	4.62	12.45	4.78
WE-7S	30.07	15.86	14.77	1.09	14.73	1.13	13.40	2.46
WE-7R	72.88	15.93	14.62	1.31	14.68	1.25	13.64	2.29
WE-114DR(3)	44.65	NA	15.76	NA	16.68	NA	17.52	NA

(1) Oil static level on July 31 = NA, August 24 = 10.65 (approximate) and September 24 = 11.66.

(2) All level, reference, bottom measurements recorded to the top of PVC inner casing.

(3) Reference survey not yet performed.

j:KinBuc\1998\TBL-3-1.XLS

Table 4-1

Kin-Buc Landfill
Operable Unit 1
Modified Monitoring Program
Third Quarter 1998
Gas Monitoring Well Network/Results

Well (Network) Location	Monitoring Result	
	% LEL	% GAS
GMW-01	0	0
GMW-02	0	0
GMW-03	0	0
GMW-04	0	0
GMW-05	0	0
GMW-06	0	0
Operational Flare Inlet	> 1,000	60

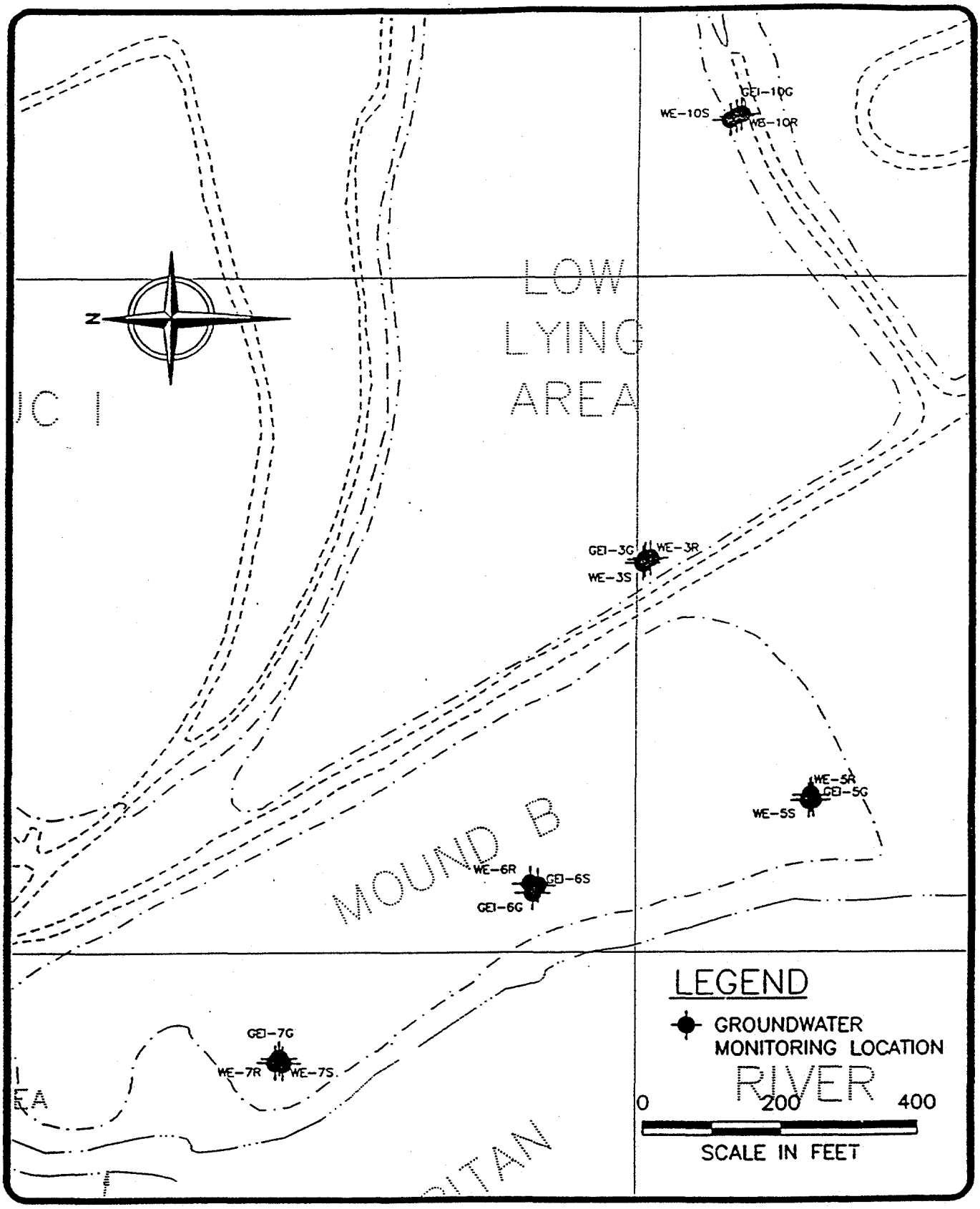
Table 5-1
KinBuc Landfill Operable Units 1 and 2
Modified Monitoring Program
Vertical Gradients Based on Third Quarter 1998
Groundwater Elevation Measurements

Well Designation	Inside/Outside Slurry Wall	July 31 Gradient	August 24 Gradient	September 24 Gradient
OU1				
W-1G / W-1R	Inside	Down	Down	Down
W-3G / W-3S	Inside	Down	Down	Down
W-3S / W-3R	Inside	Down (2)	Down	Down
W-5G / W-5S	Inside	Down	Down	Down
W-5S / W-5R	Inside	Down	Down	Even (2)
W-7G/W-7S	Inside	Down	Down	Down
W-7S / W-7R	Inside	Even (2)	Even (2)	Even (2)
W-9G / W-9R	Inside	Down	Down	Down
W-15G / W-15S	Inside (1)	Up	Up	Up
W-6G / W-6S	Outside	Down	Down	Down
W-6S / W-6R	Outside	Even (2)	Even (2)	Even (2)
W-2G / W-2R	Outside	Down	Down	Down
W-4G / W-4S	Outside	Down	Down	Down
W-4S / W-4R	Outside	Down	Down	Down
W-8S / W-8R	Outside	Down	Down	Down
W-10G / W-10R	Outside	Down	Down	Down
W-13G / W-13S	Outside (2)	Down	Down	Down
OU2				
GEI-10G / WE-10S		Down	Down	Down
WE-10S / WE-10R		Even (2)	Even (2)	Even (2)
GEI-3G / WE-3S		Down	Down	Down
WE-3S / WE-3R		Up	Even (2)	Up
GEI-5G / WE-5S		Down	Down	Down
WE-5S / WE-5R		Down	Down	Even (2)
GEI-6G / GEI-6S		Down	Down	Down
GEI-6S / WE-6R		Down	Down	Down
GEI-7G / WE-7S		NA	Down	Down
WE-7S / WE-7R		Up	Up	Down

(1) Refers to alignment along Oil Seeps Area extended slurry wall.

(2) Vertical gradient is less than 0.10 foot difference up or down. Designation is even due to manual accuracy considerations.

Figure



ene-mlown2/data: F:\DWG\12568001\MAKBF-01.dwg Xrefs: 8X11P, MAKBWE01, MAKBTW01, MAKBB001
Scale: 1 = 200.0000 Date: 8/7/96 Time: 3:27 PM Operator: FDEGEORG

emcon

DATE
DWN DBT
APP RB
REV

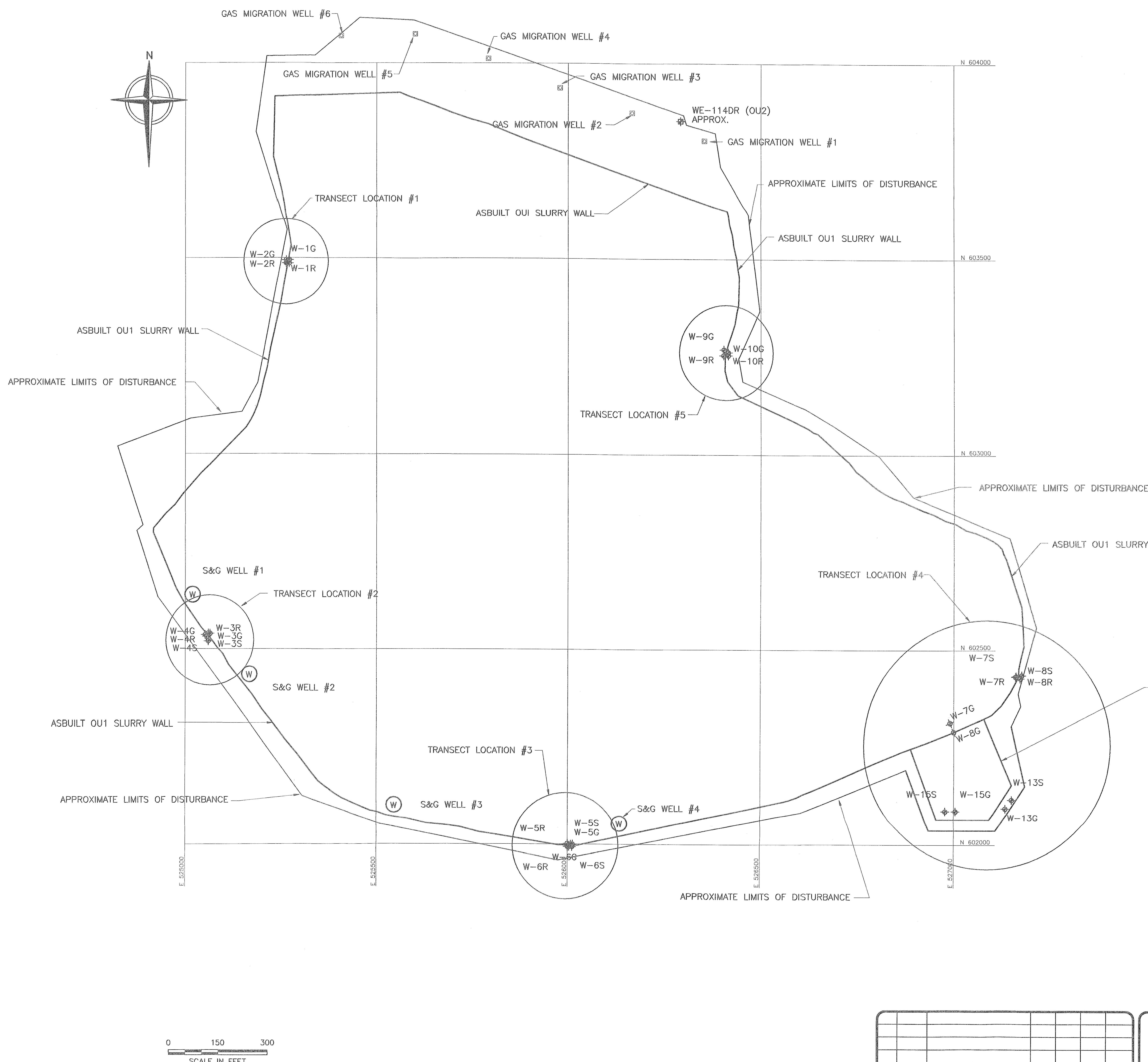
KINBUC LANDFILL

EDISON TOWNSHIP, NEW JERSEY

OU2 GROUNDWATER MONITORING LOCATIONS

FIGURE
1-1
PROJECT NO.
12568-001.000

502018



LEGEND

- NEW MONITORING WELLS
- (W) NEW SAND & GRAVEL PUMPING WELLS
- NEW GAS MIGRATION WELLS
- OU2 UPGRADIENT MONITORING BEDROCK WELL (APPROXIMATE LOCATION)

SOURCE: BASEMAP DATA TAKEN FROM PLAN SHEET 10A OF MAP ENTITLED "KINBUC LANDFILL FINAL WELL LOCATION PLAN" PREPARED BY CONTI ENVIRONMENTAL INC. DATED JULY 17, 1995.

NOTES:
1. THE MONITORING WELL LOCATIONS W-7G, W-8G, W-13G, W-13S, W-15G, AND W-15S ARE APPROXIMATE.
2. MONITORING WELL W-8R IS DAMAGED AND NOT SERVICABLE AS A WATER QUALITY MONITORING POINT.
3. MONITORING WELLS W-7G AND W-8G REPLACED BY W-15G AND W-13G.

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
DATE OF ISSUE 5/96		DWN BY SDT DES BY RB		CHK BY APP BY		

EMCON

KIN-BUC LANDFILL
EXISTING GROUNDWATER MONITORING PLAN
EDISON TOWNSHIP, NEW JERSEY

OPERABLE UNIT 1 MONITORING NETWORK

DRAWING NO. 1

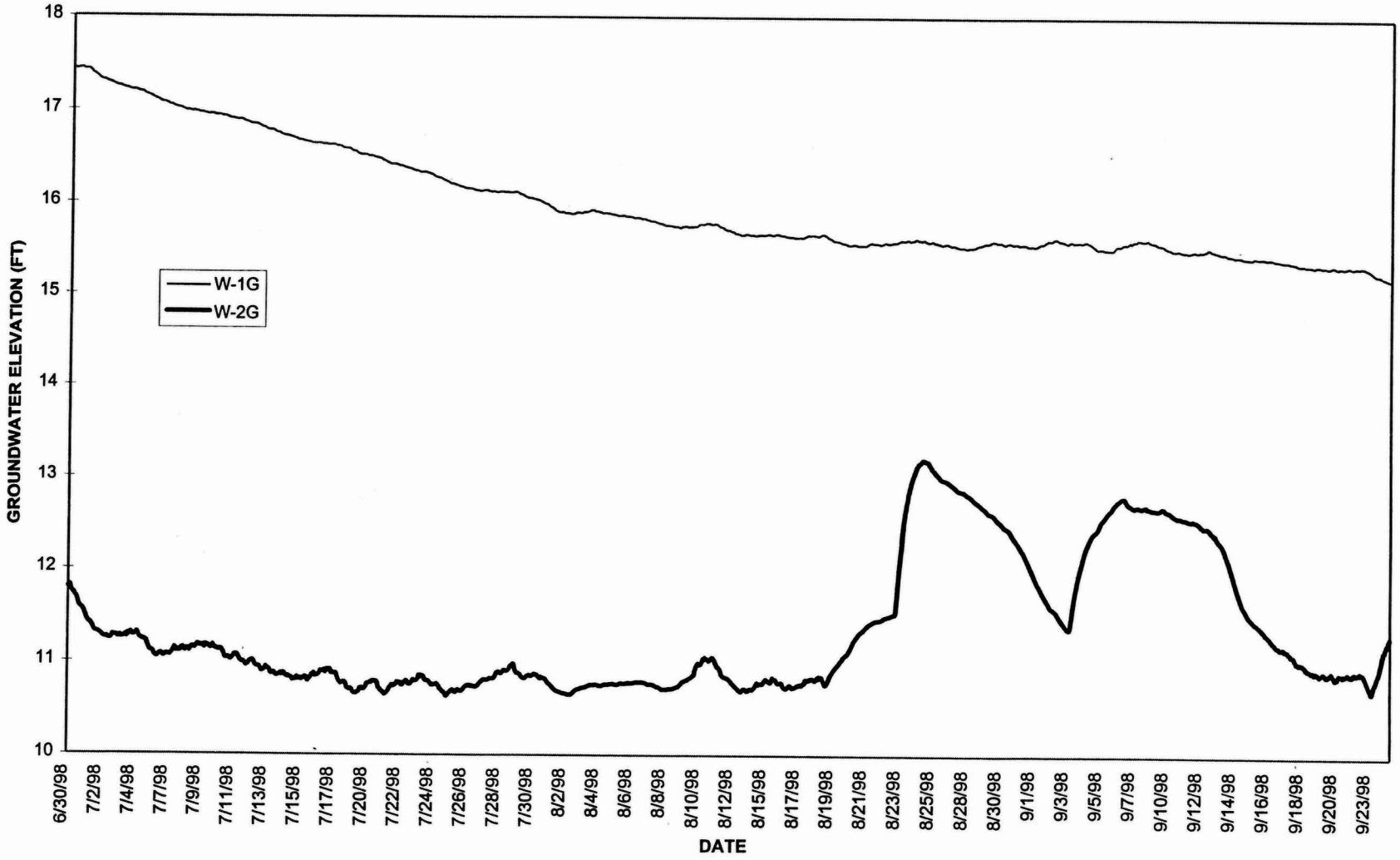
PROJECT NO. 01862-025.000

502019

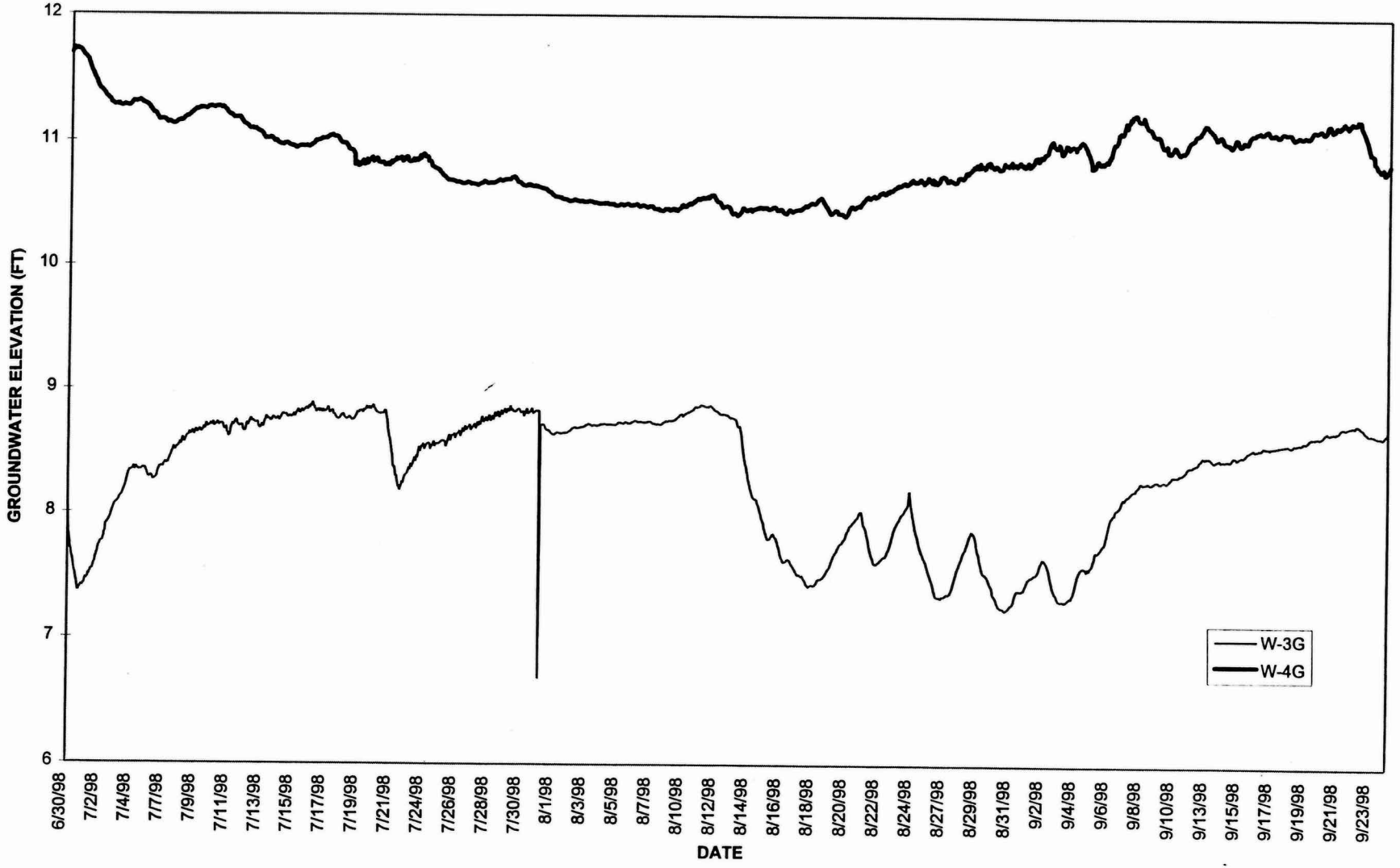
APPENDIX A

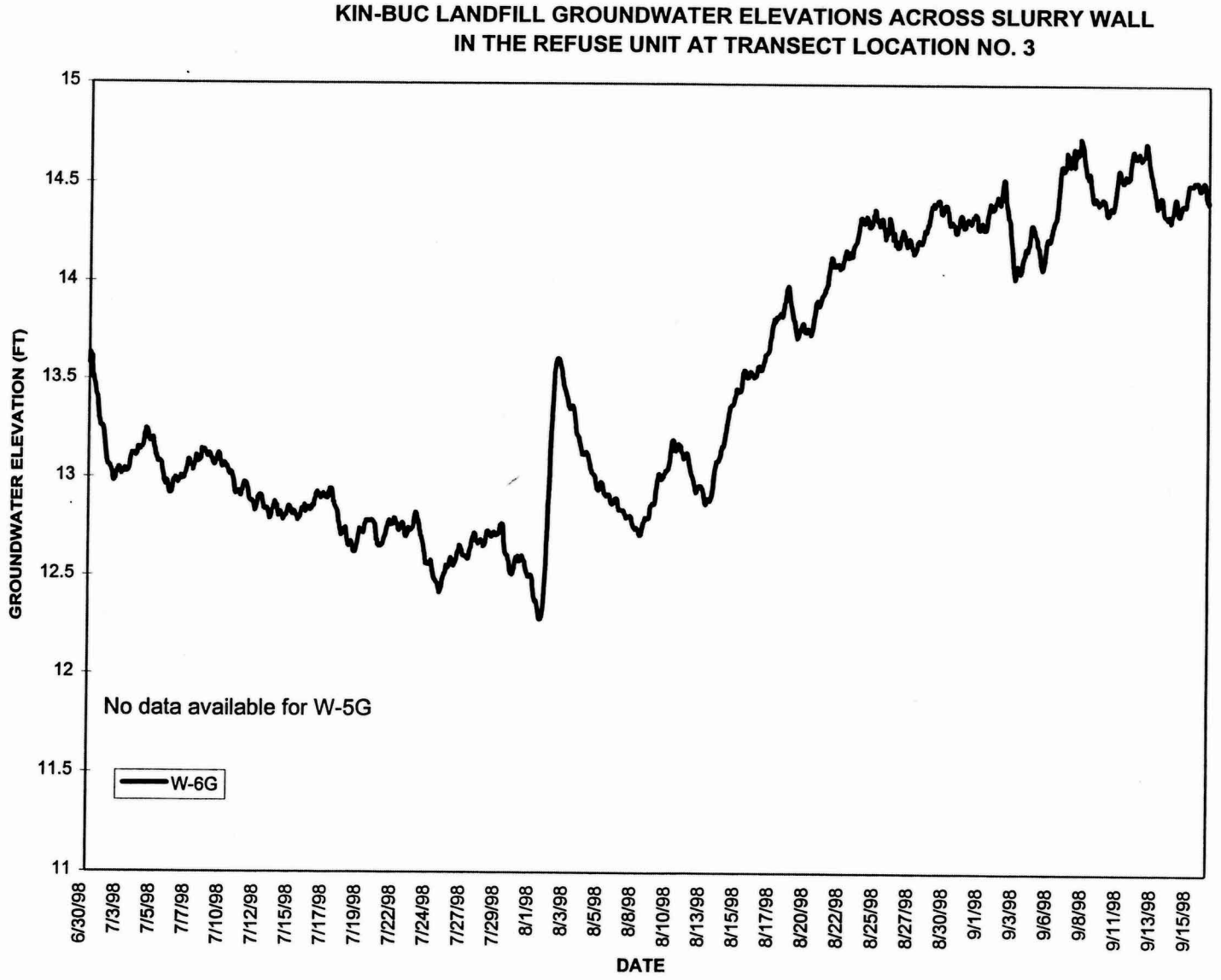
OU1 / OIL SEEPS REFUSE WELLS CONTINUOUS WATER LEVEL MONITORING RESULTS

KIN-BUC LANDFILL GROUNDWATER ELEVATIONS ACROSS SLURRY WALL IN THE REFUSE UNIT AT TRANSECT LOCATION NO. 1

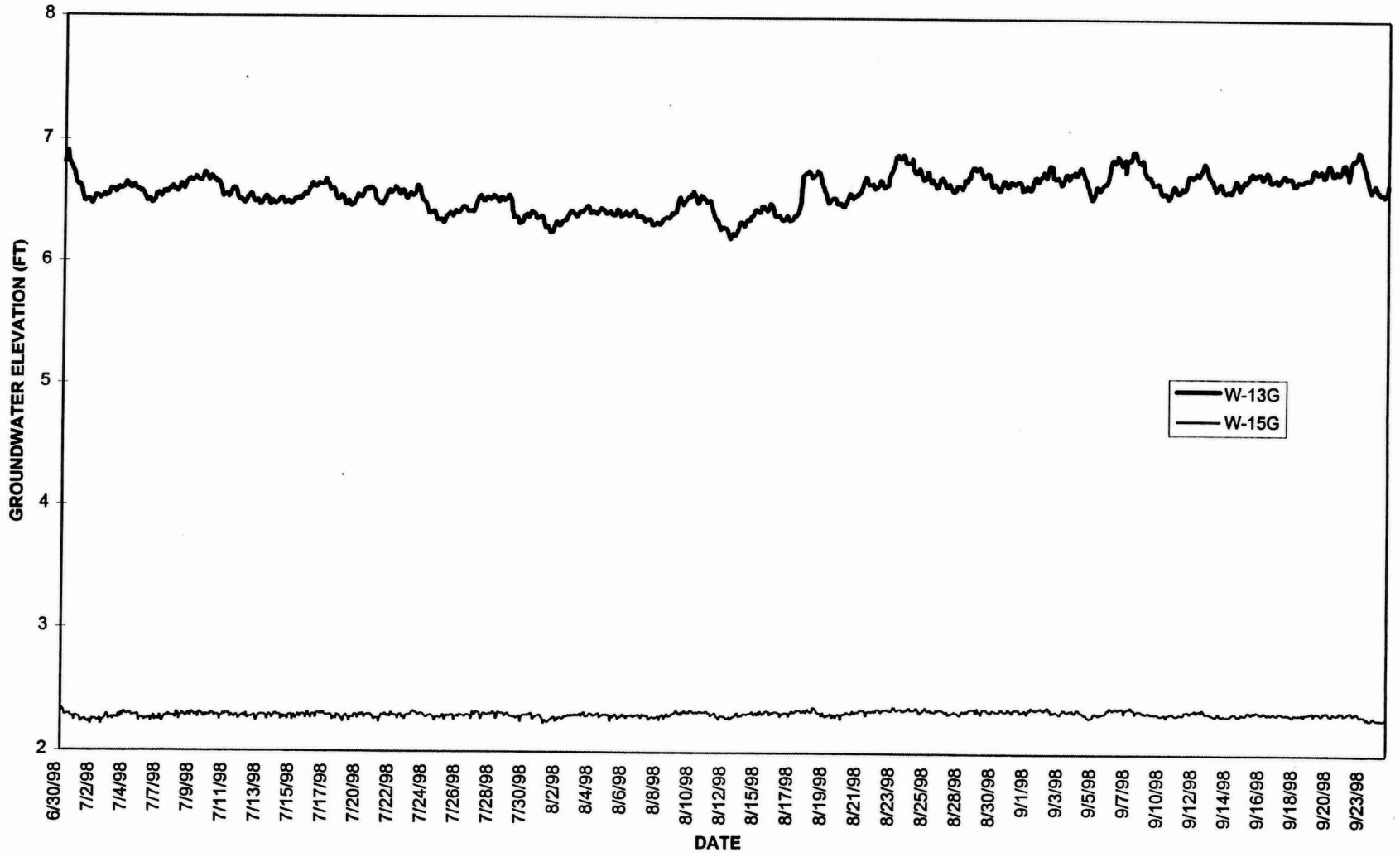


KIN-BUC LANDFILL GROUNDWATER ELEVATIONS ACROSS SLURRY WALL
IN REFUSE UNIT AT TRANSECT LOCATION NO. 2

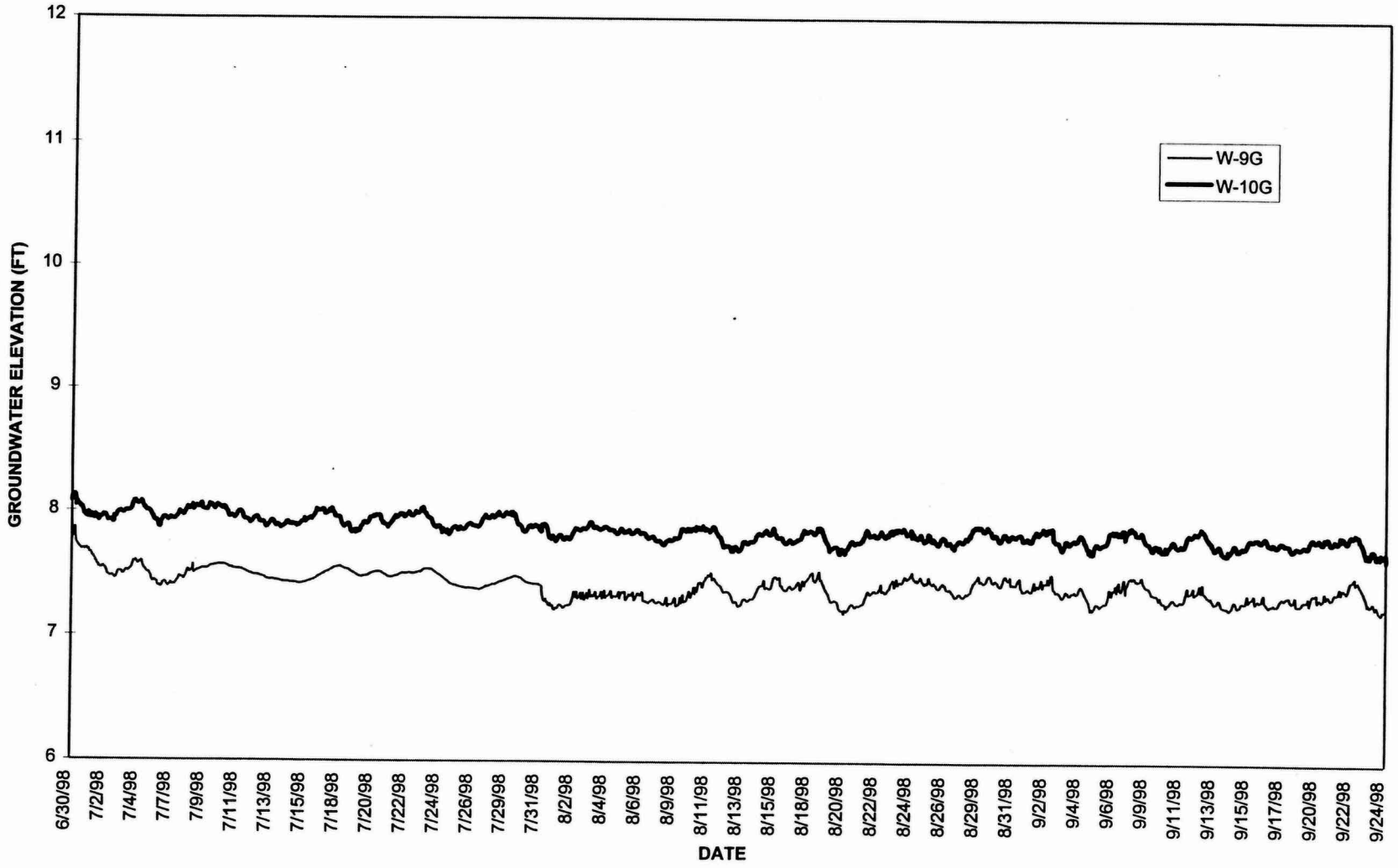



KIN-BUC LANDFILL GROUNDWATER ELEVATIONS ACROSS SLURRY WALL
IN THE REFUSE UNIT AT TRANSECT LOCATION NO. 3
GROUNDWATER ELEVATION (FT)
15
14.5
14
13.5
13
12.5
12
11.5
11
No data available for W-5G
W-6G
6/30/98
7/3/98
7/5/98
7/7/98
7/10/98
7/12/98
7/15/98
7/17/98
7/19/98
7/22/98
7/24/98
7/27/98
7/29/98
8/1/98
8/3/98
8/5/98
8/8/98
8/10/98
8/13/98
8/15/98
8/17/98
8/20/98
8/22/98
8/25/98
8/27/98
8/30/98
9/1/98
9/3/98
9/6/98
9/8/98
9/11/98
9/13/98
9/15/98
DATE

KIN-BUC LANDFILL GROUNDWATER ELEVATIONS ACROSS SLURRY WALL IN THE REFUSE UNIT AT TRANSECT LOCATION NO. 4



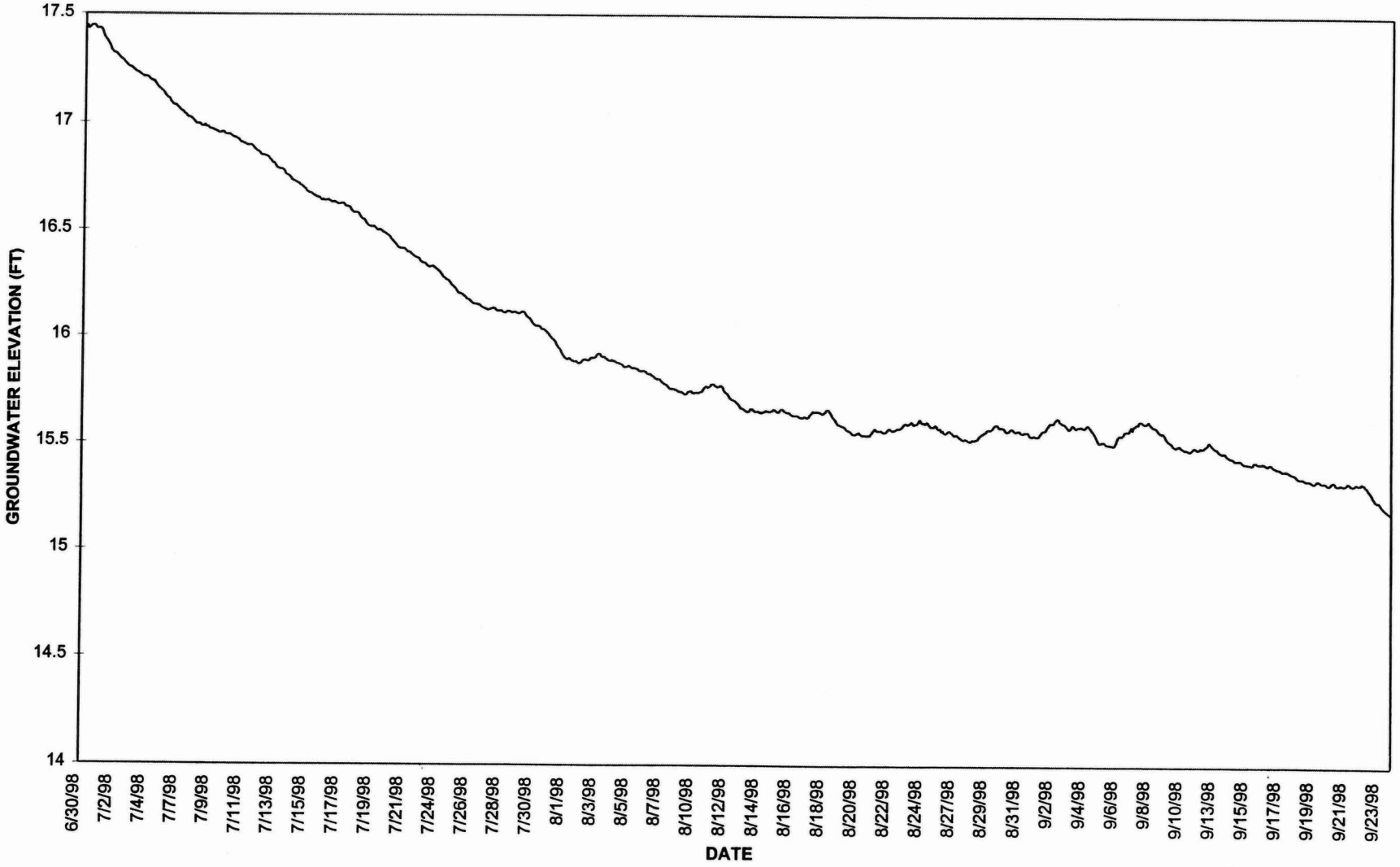
KIN-BUC LANDFILL GROUNDWATER ELEVATIONS ACROSS SLURRY WALL IN THE REFUSE UNIT AT TRANSECT LOCATION NO. 5



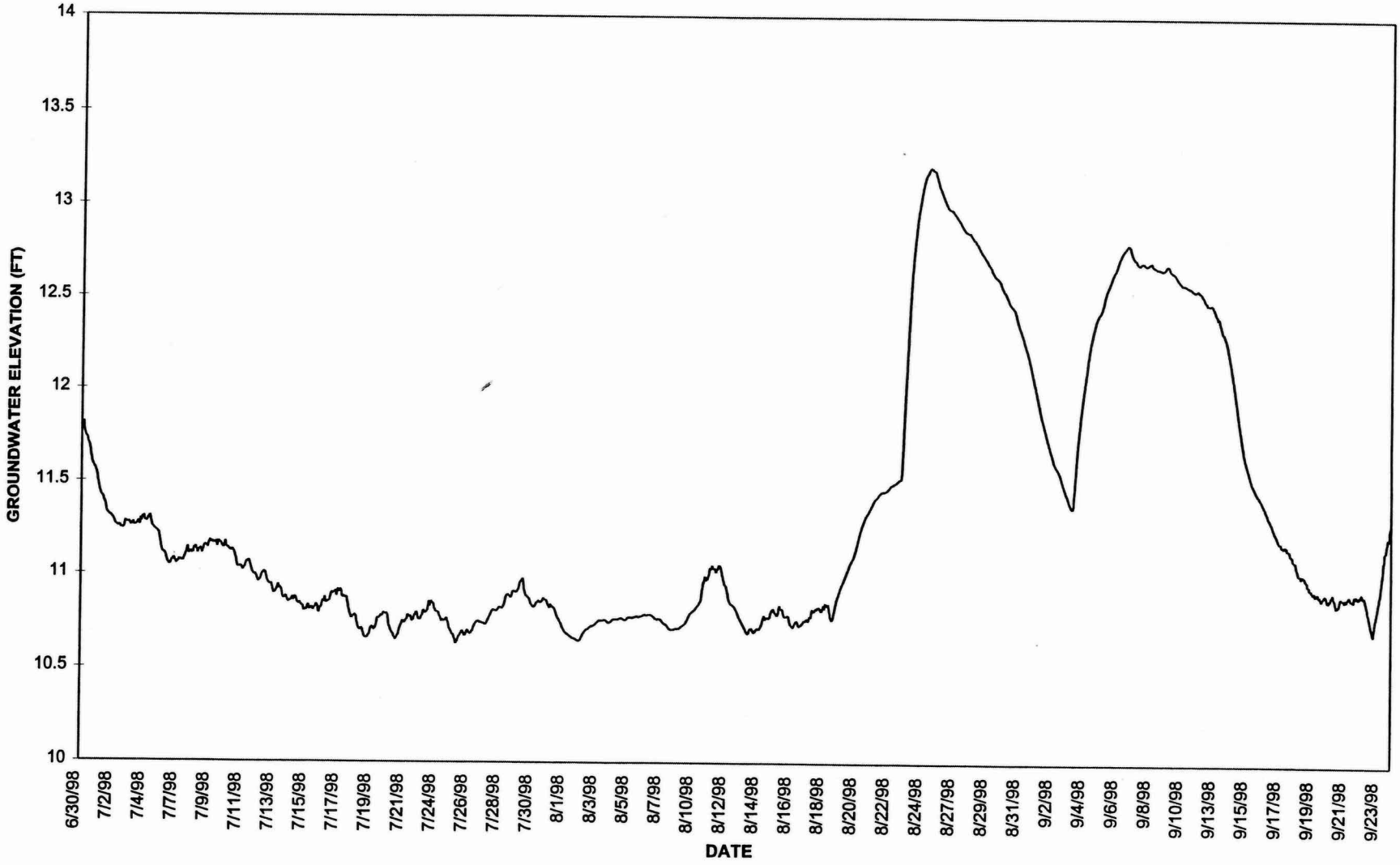
APPENDIX B

OU1 / OIL SEEPS WELLS CONTINUOUS WATER LEVEL MONITORING HYDROGRAPHS

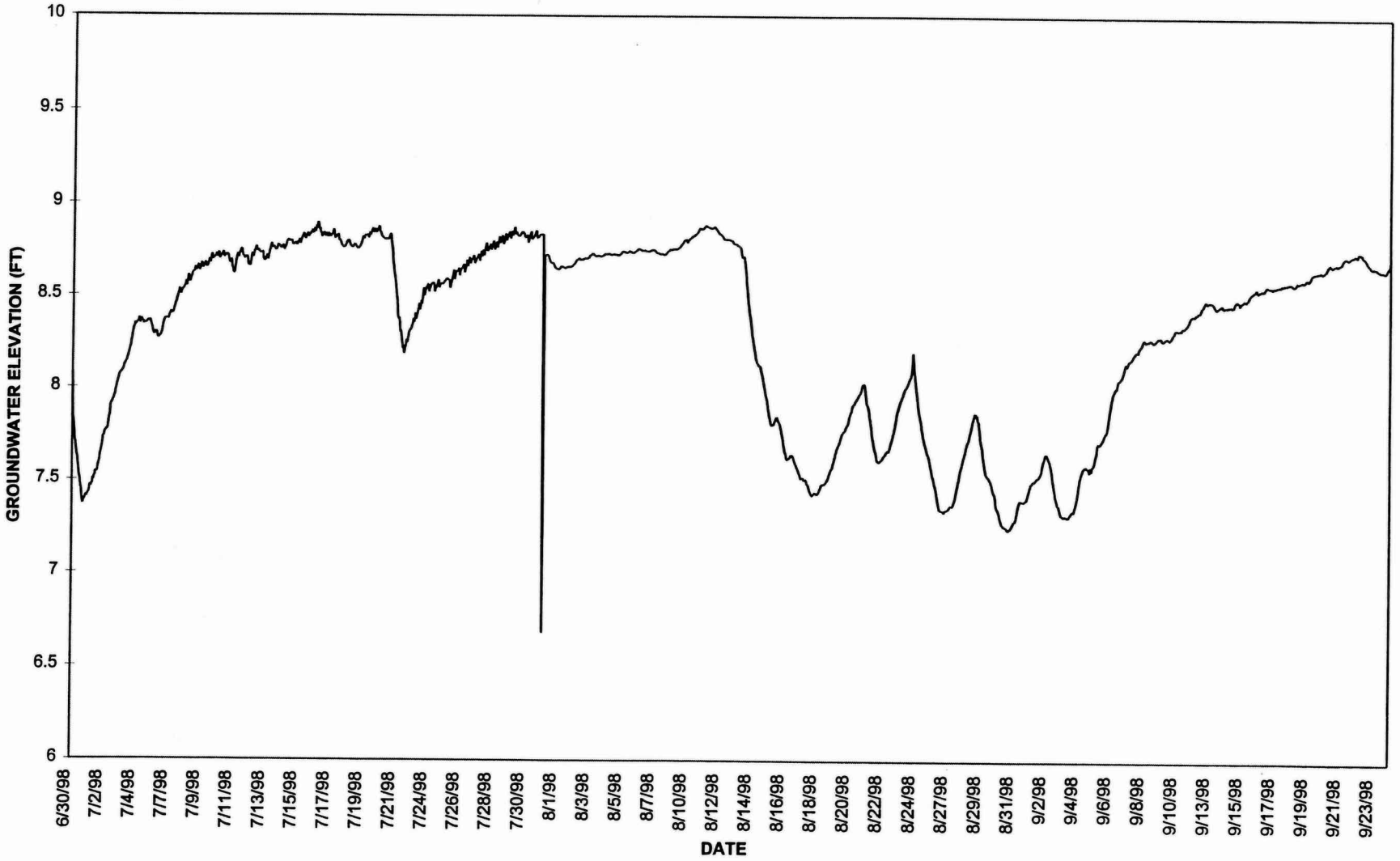
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 1G REFUSE UNIT



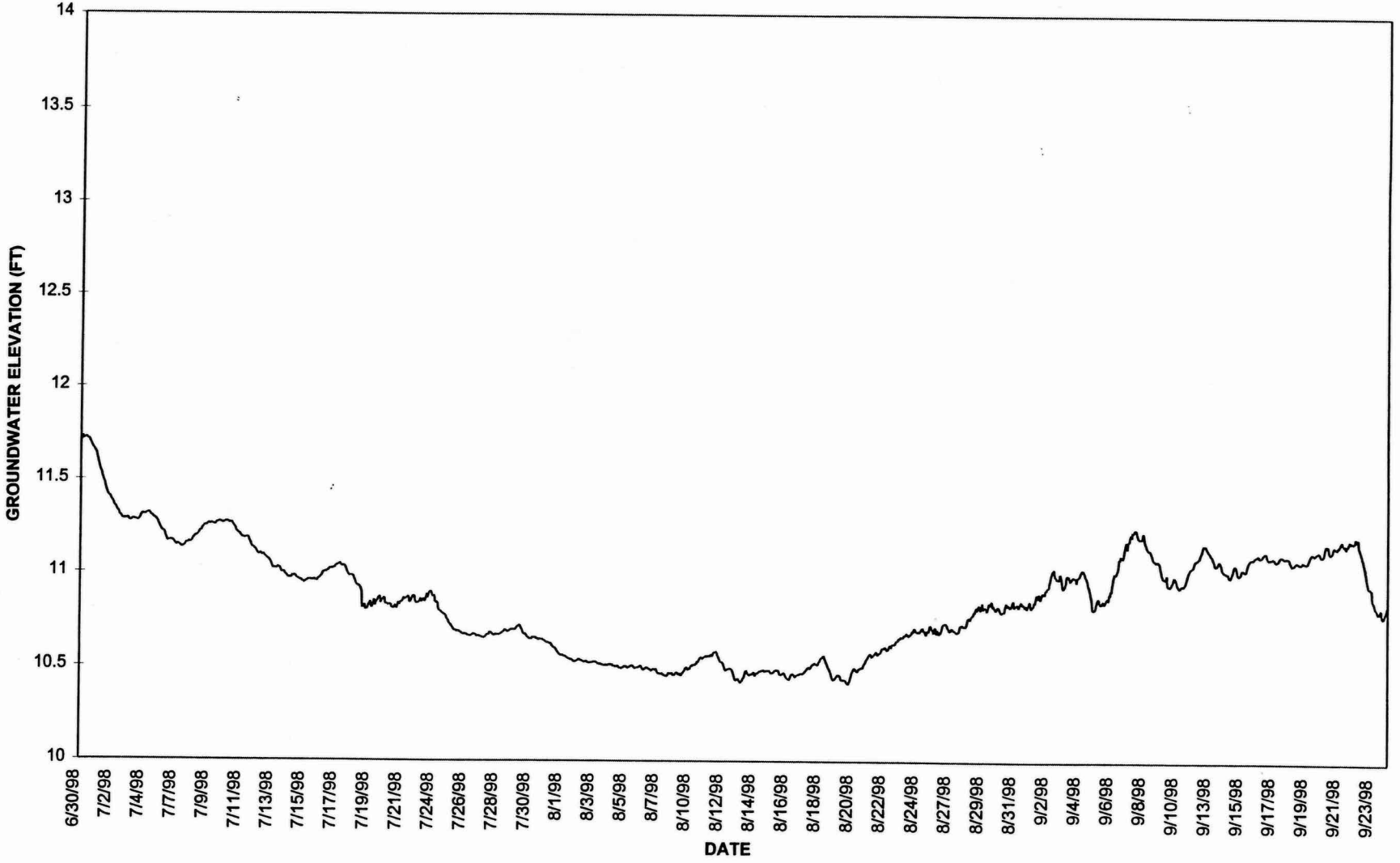
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 2G REFUSE UNIT



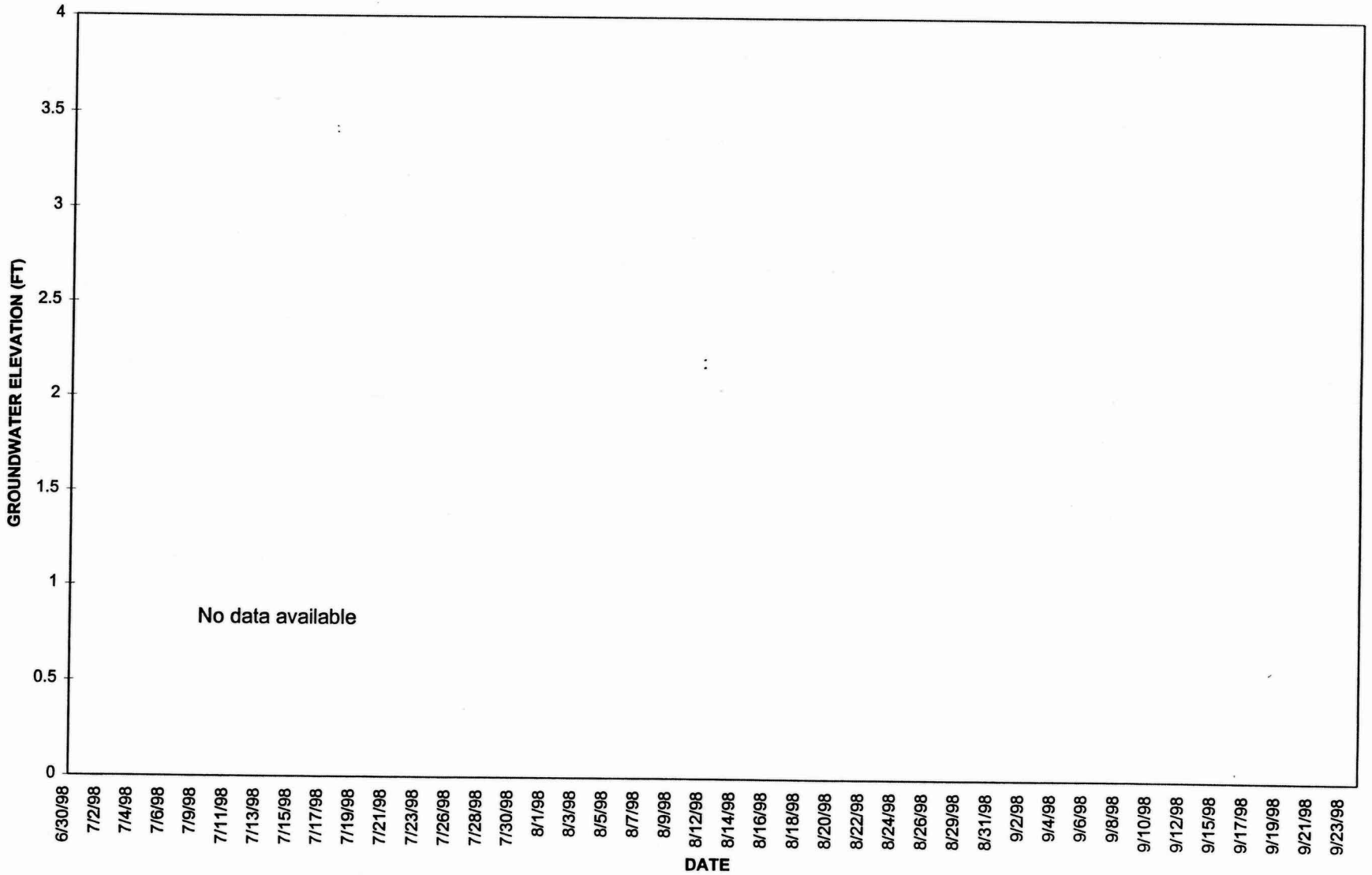
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 3G REFUSE UNIT



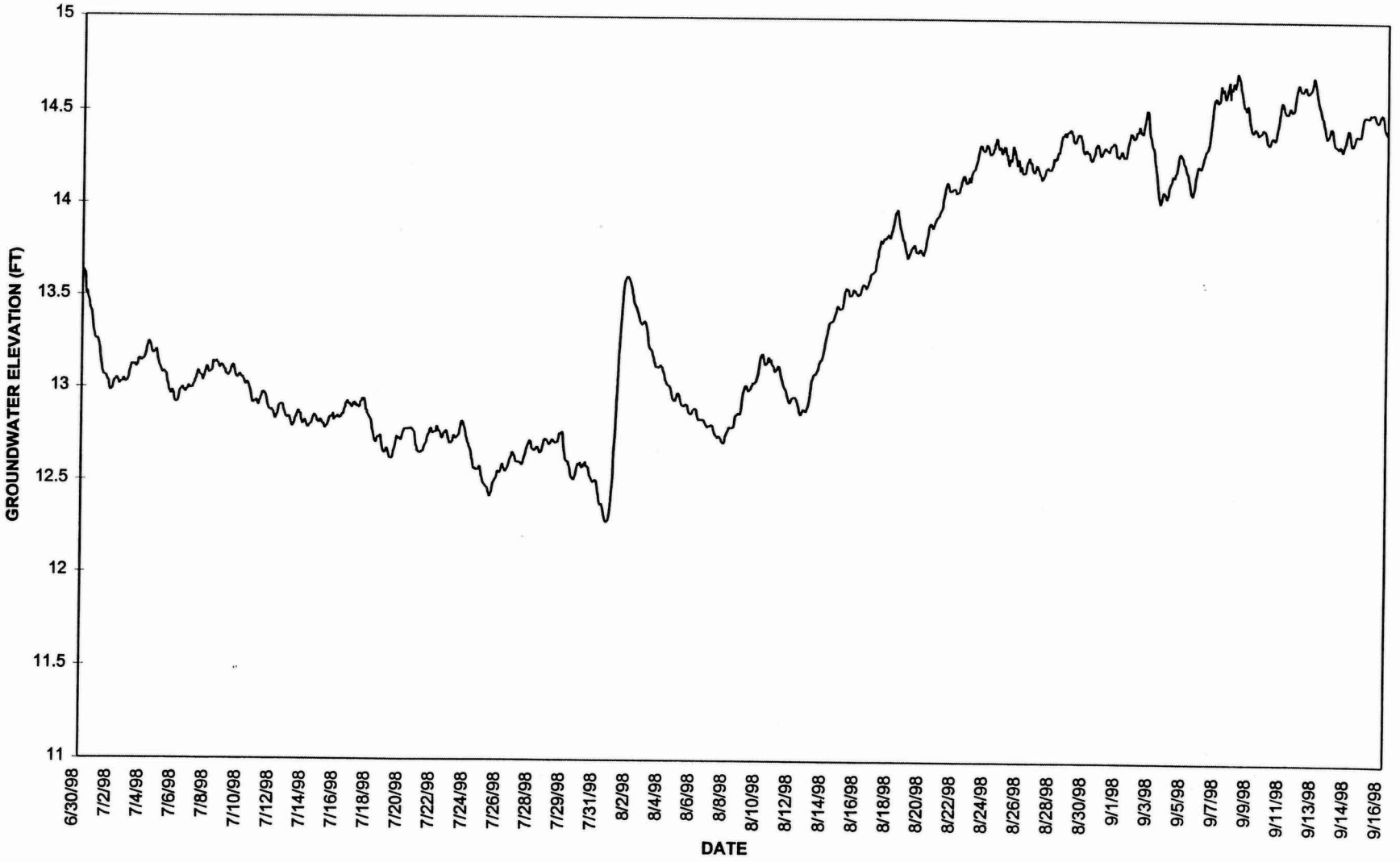
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 4G REFUSE UNIT



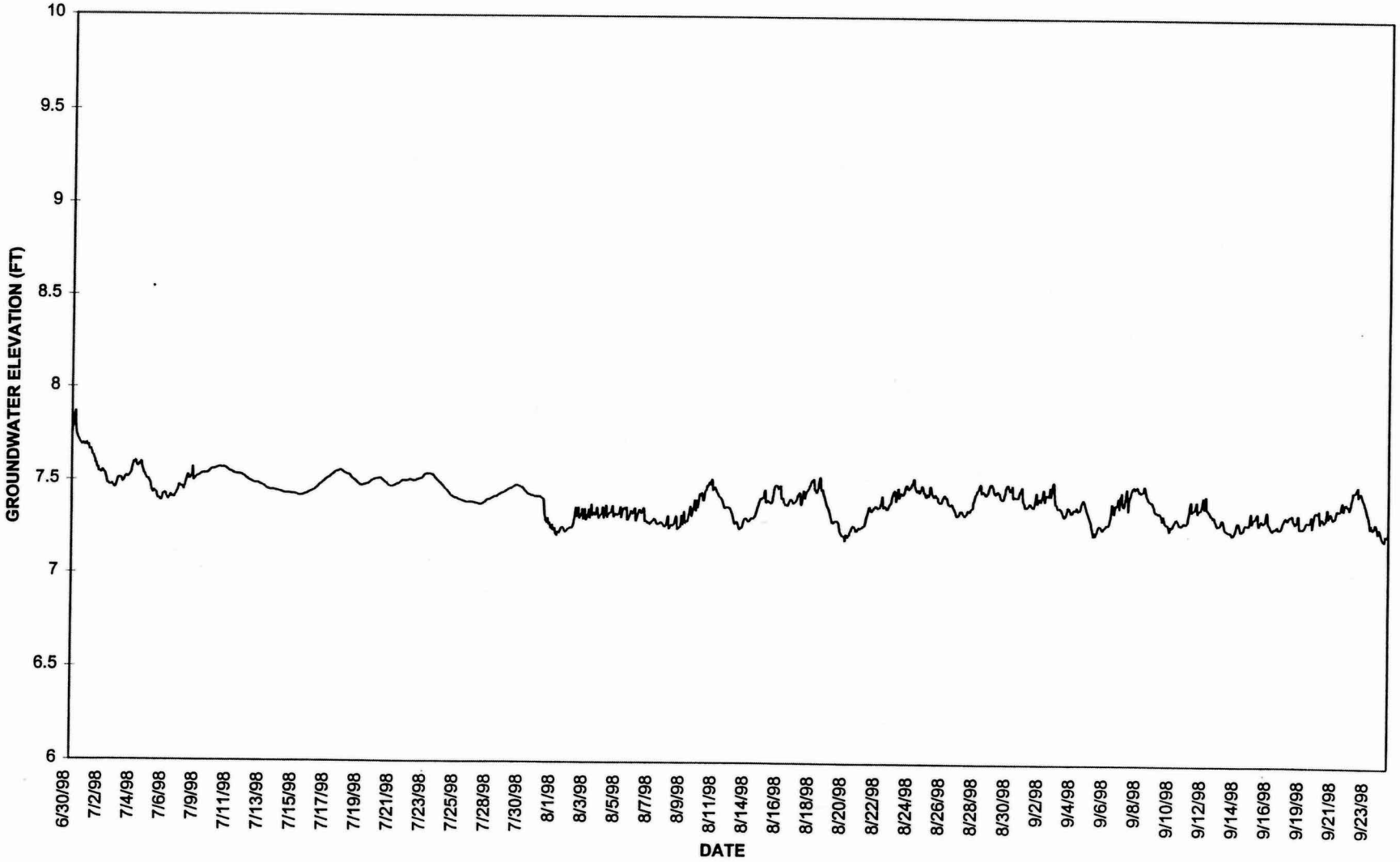
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 5G REFUSE UNIT



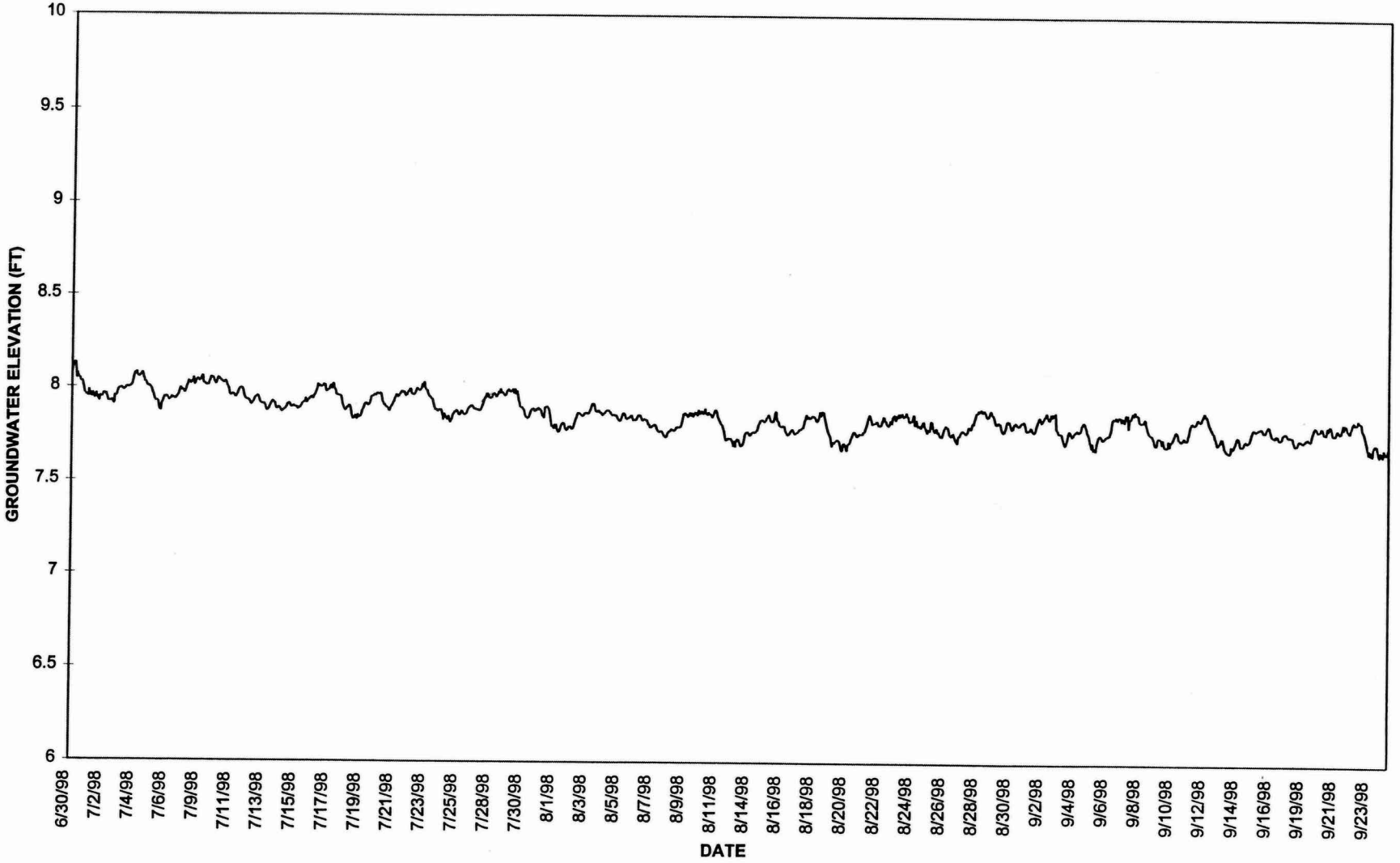
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 6G REFUSE UNIT



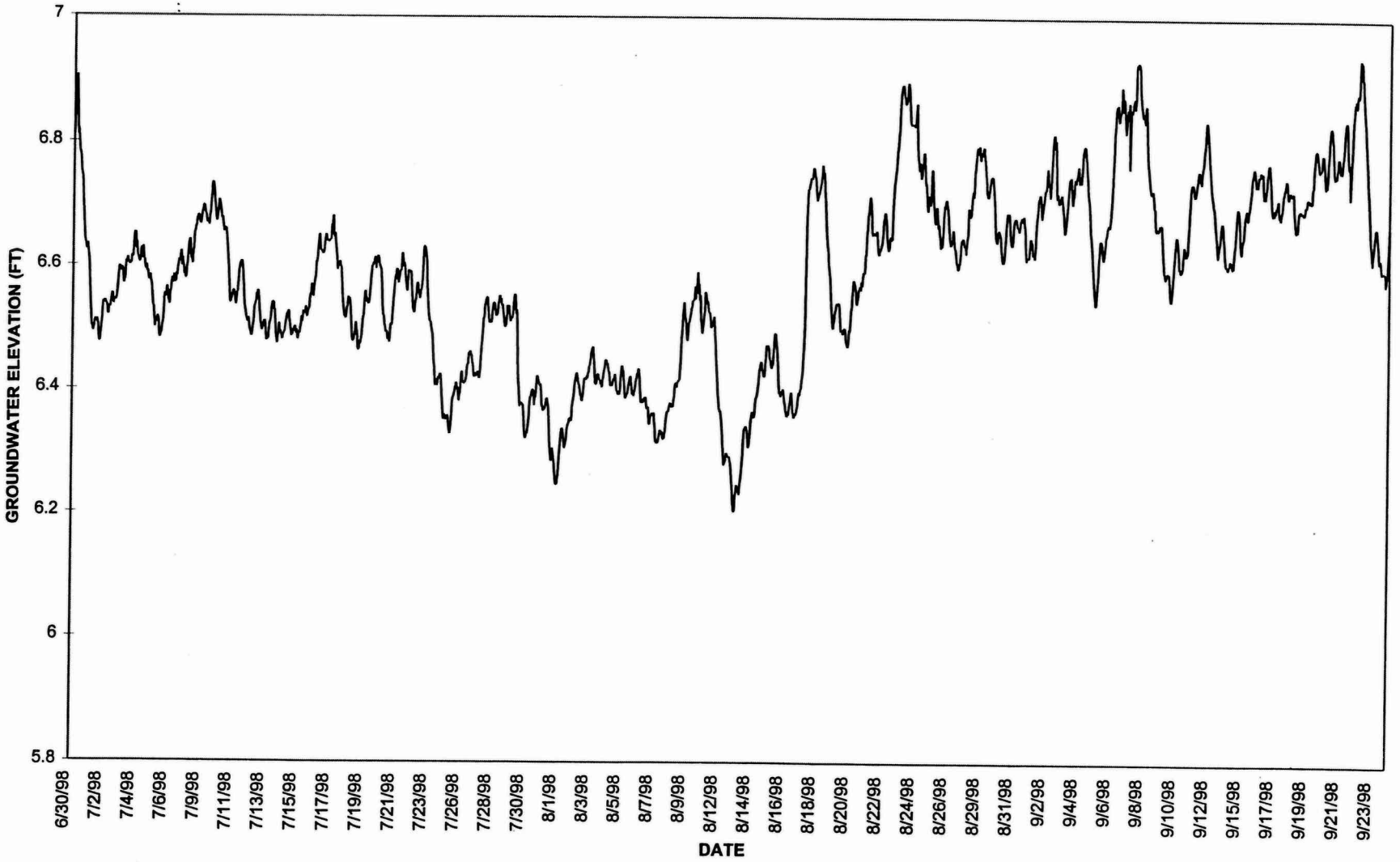
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 9G REFUSE UNIT



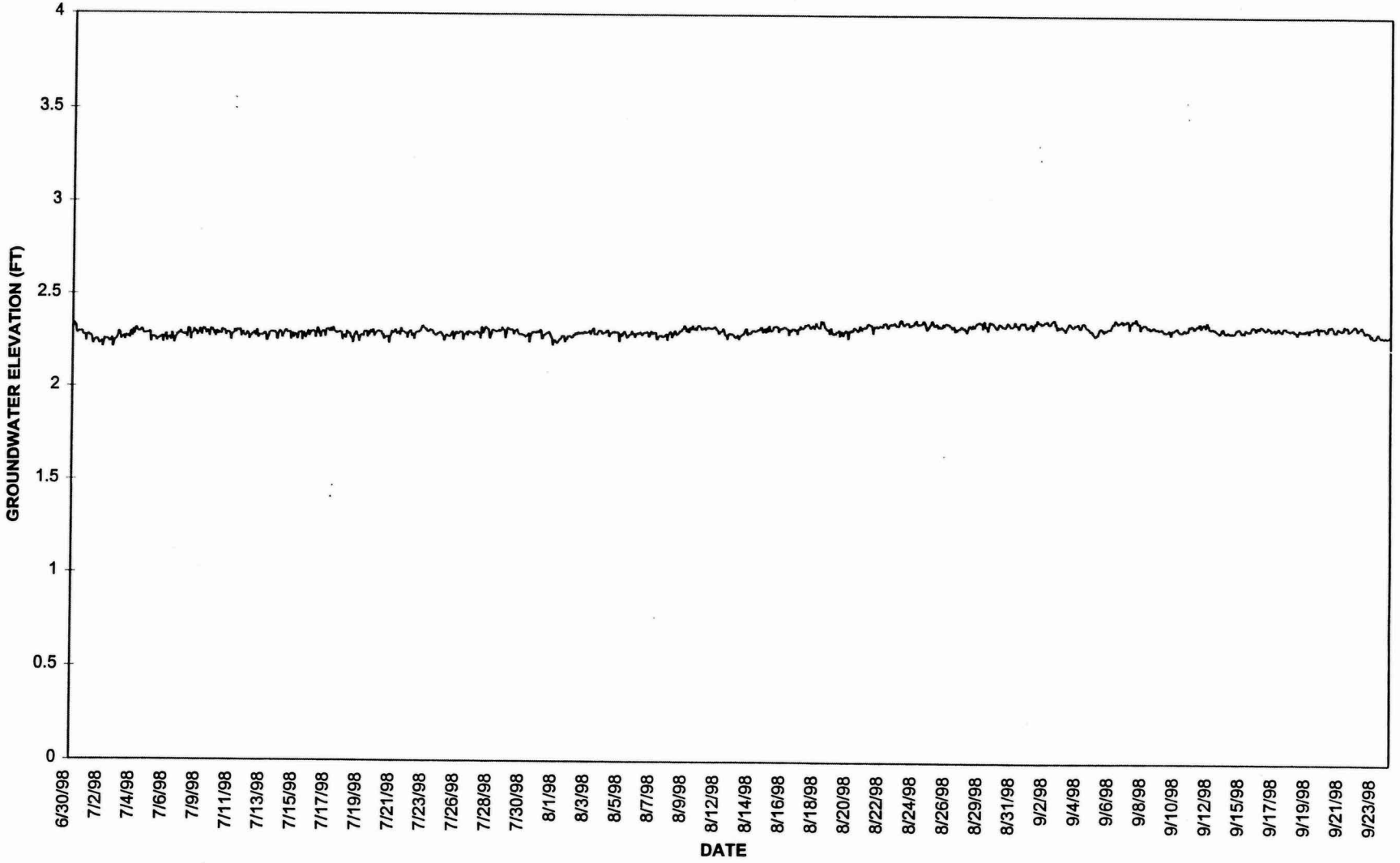
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 10G REFUSE UNIT



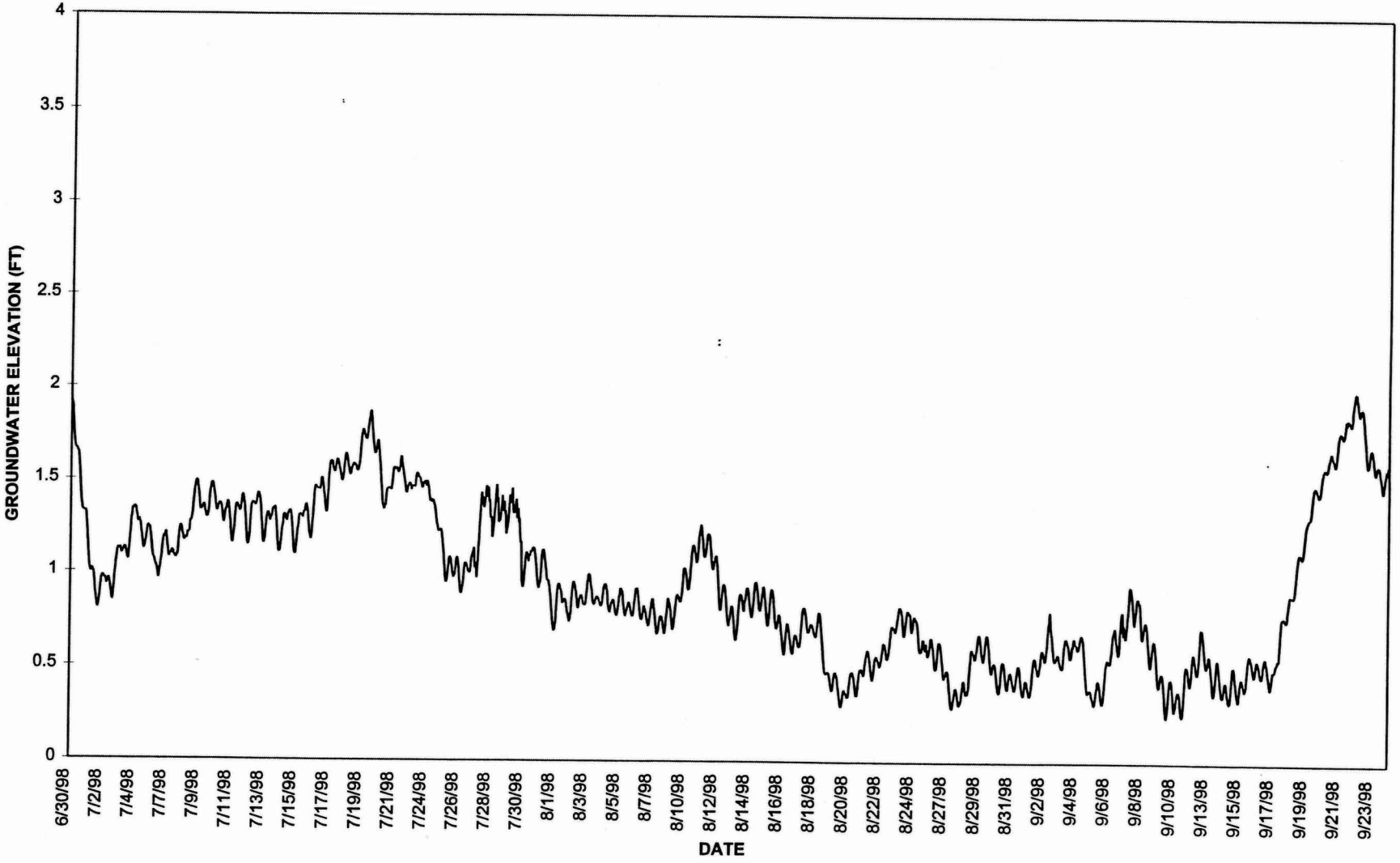
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 13G REFUSE UNIT



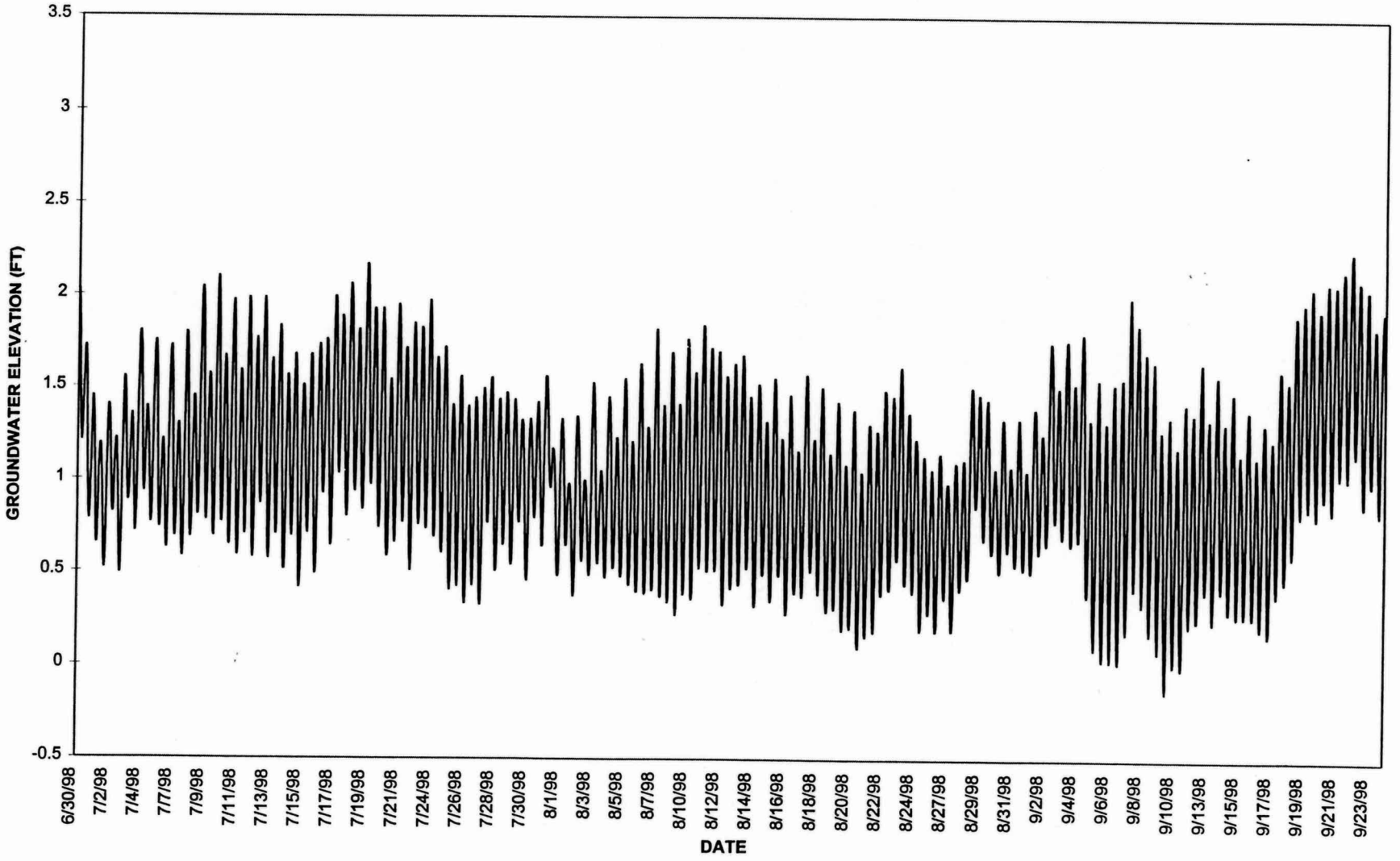
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 15G REFUSE UNIT



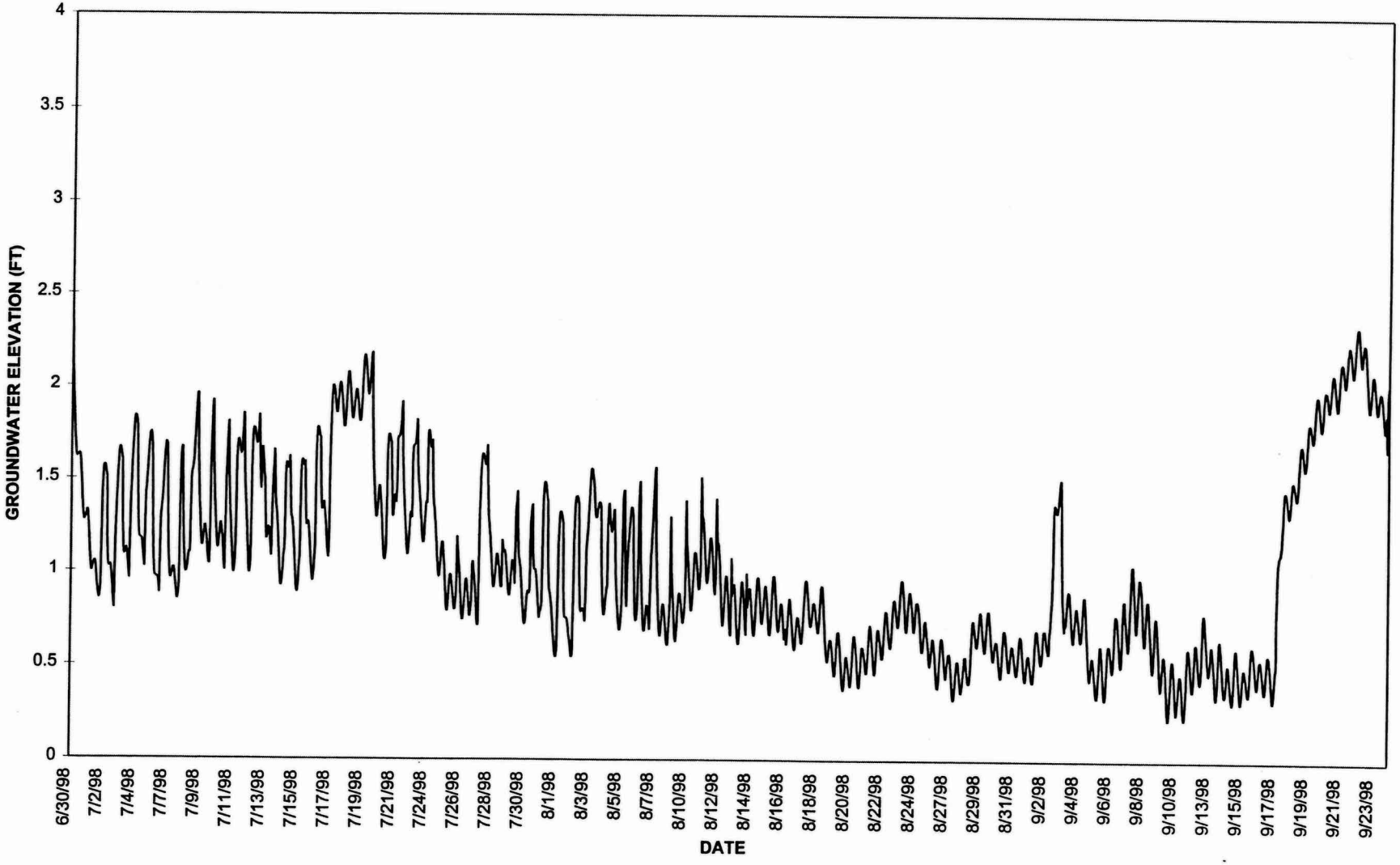
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 3S SAND AND GRAVEL UNIT



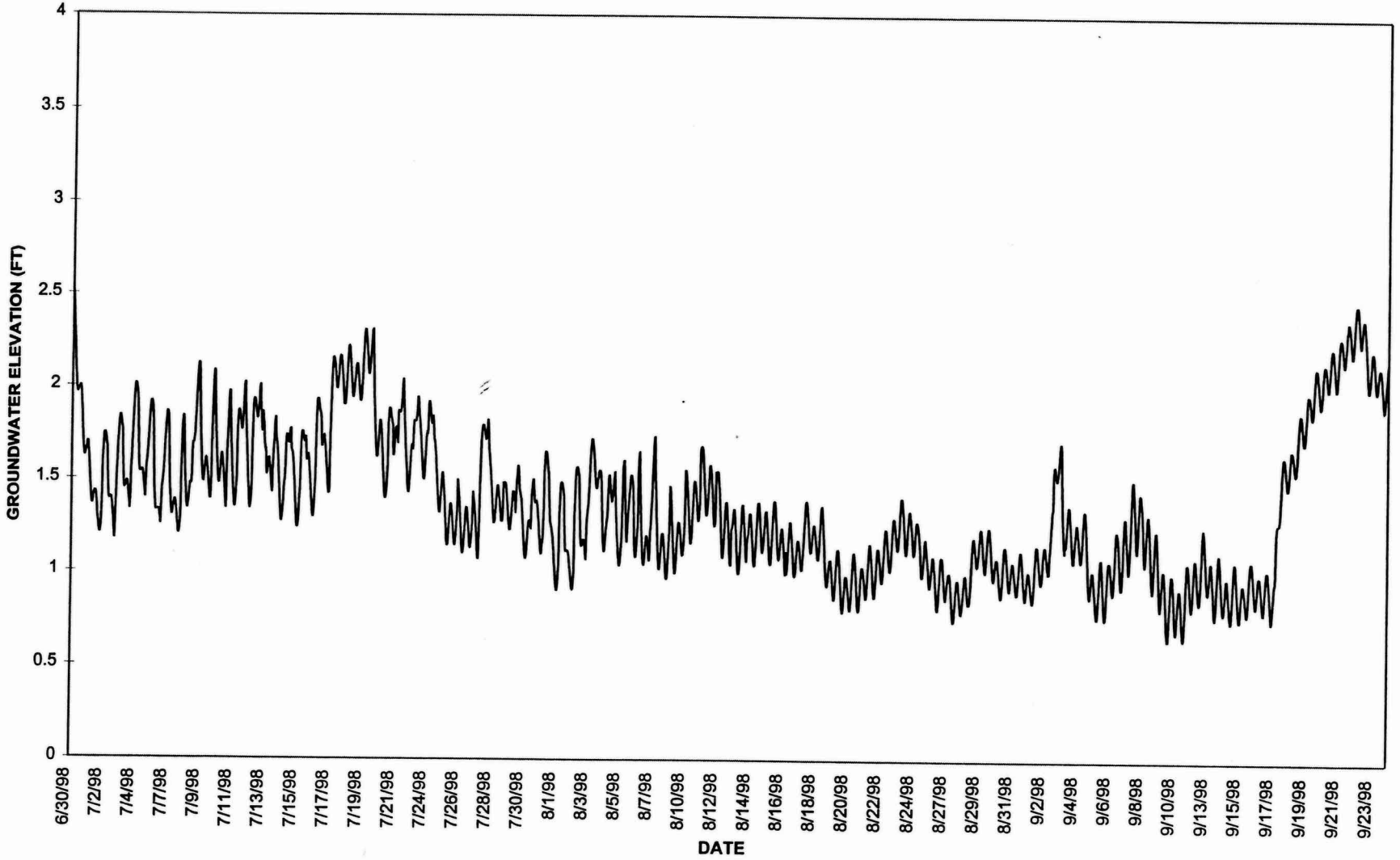
KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 4S SAND AND GRAVEL UNIT



KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 5S SAND AND GRAVEL UNIT



KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 6S SAND AND GRAVEL UNIT



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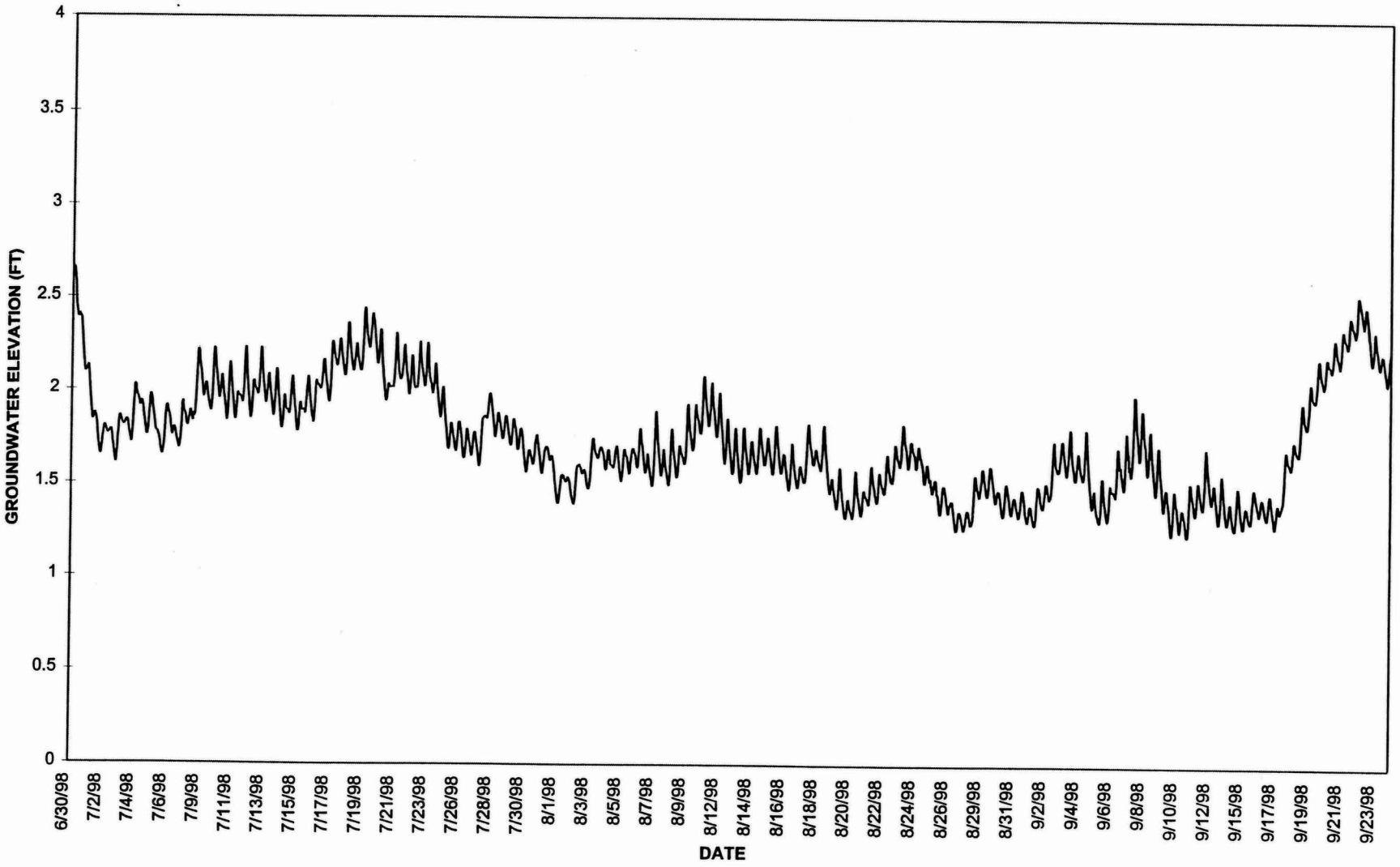

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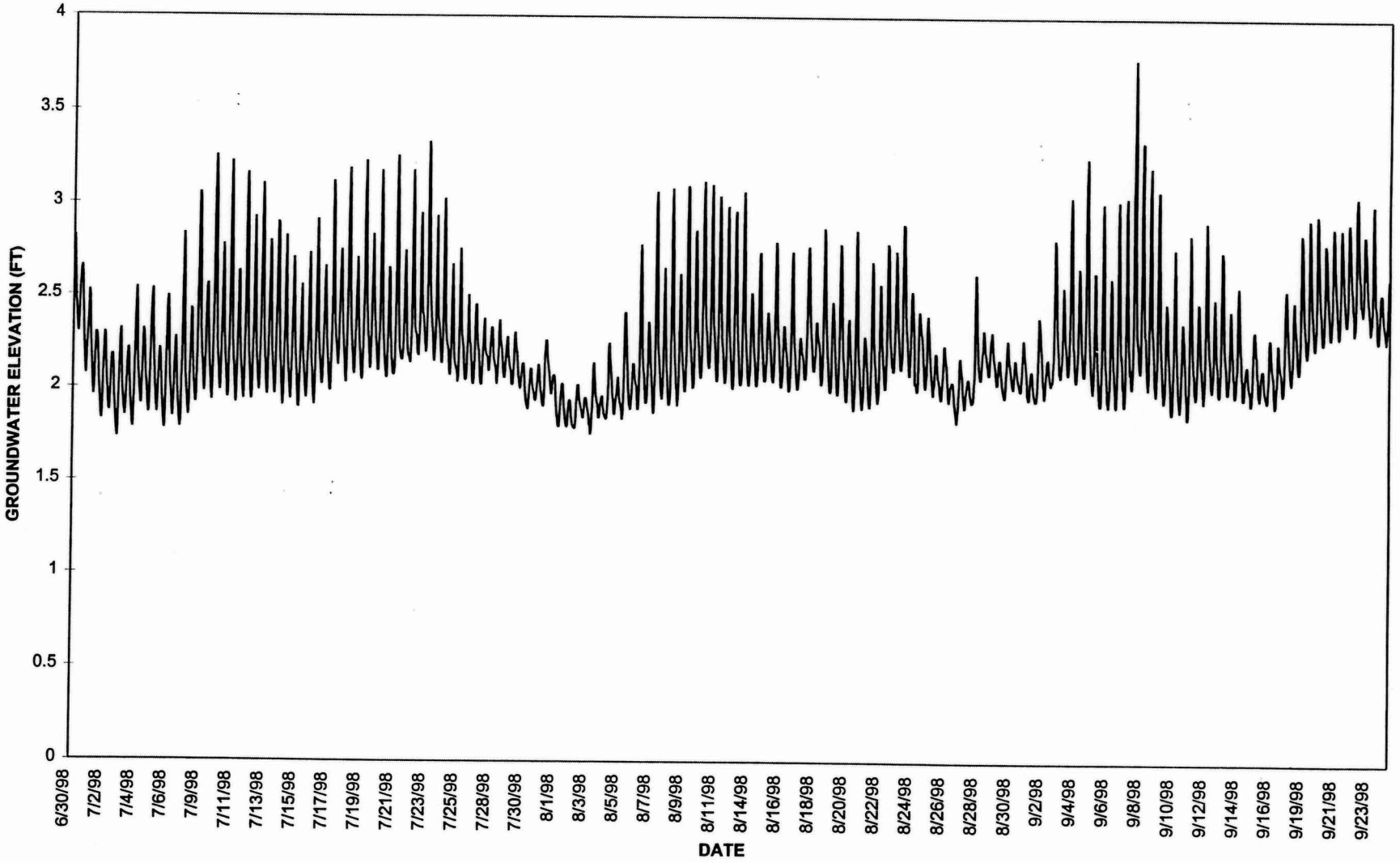

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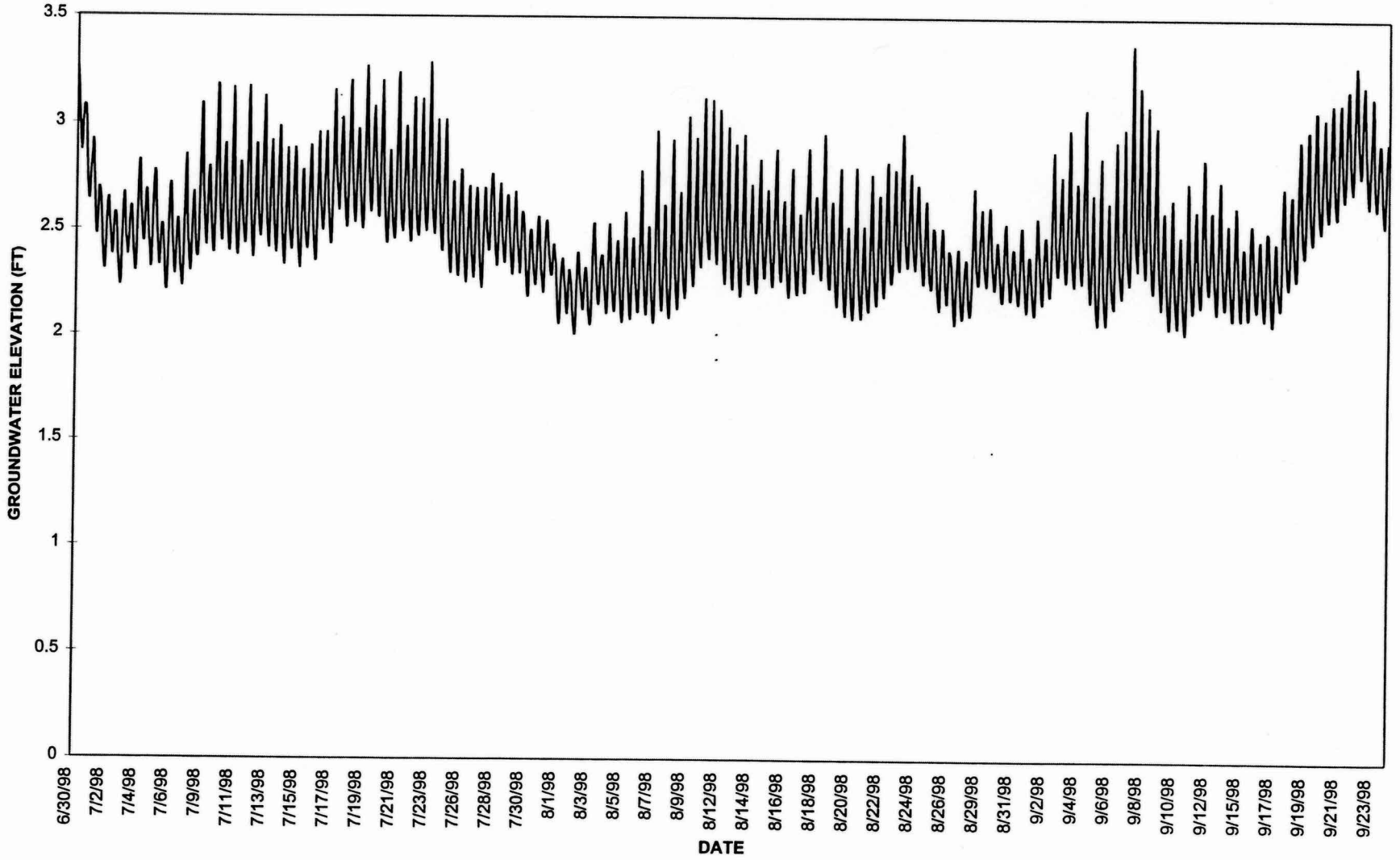

KIN-BUC LANDFILL GROUNDWATER ELEVATION HYDROGRAPH 15S SAND AND GRAVEL UNIT